

**LightAide™ Implementation Study**  
(TERC, Out-of Budget Award, Project #4004)

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March 2015

## Overview

Designed by Philips Color Kinetics (PCK) and marketed by Perkins Products, the LightAide (LA) is an assistive tool for pre-K through upper elementary-grade students with visual impairments. With this study, we investigated implementation of the LightAide in school and home settings, with teachers and parents who have purchased the device and used it for instruction with students who are visually impaired or have other disabilities. A prior study that involved a survey of 11 LightAide purchaser users who had used the device and the activity sets that come with it for less than 6 months (Vesel & Robillard 2014) indicated the following. The LightAide

- meets the needs of a range of students with varied and unique needs and a range of teachers in varied settings with differing expertise;
- serves the needs of students with Cortical Visual Impairment (CVI) particularly well;
- engages users by initially stimulating their vision and maintaining their attention so that they can attend to light for adequate periods of time during which exposure to core concepts can occur;
- may add value to the teaching and learning of students in and beyond its intended audience.

The LightAide became commercially available from Perkins Products in September of 2013. Since then, it has been marketed worldwide to teachers of the visually impaired and parents of children who have low vision (Winter 2013). To date, approximately 140 LightAide packages that include the device and a preloaded Starter Activity set of 10 activities have been purchased for home, therapy and/or school use. The price of the package is \$999. The number of purchasers includes teachers or school districts that made a single one-time purchase as well as those that later on purchased additional units.

For the study, we surveyed a sample of LightAide users that included teachers and parents who had purchased the LightAide and used it in formal classroom or home settings for a period of time. The sample included parents and teachers who had recently purchased the device and had been using it for a short period of time and those who had purchased it during the 2013-2014 school year and continued to use it in 2014-2015.

## Goals

The goals of the study were to begin to characterize LightAide users, find out how they use the device, and to start to establish its potential benefits for teaching and learning. To accomplish our goal(s), we focused on the following research questions:

- 1) What are the characteristics of LightAide users?
- 2) How do teachers and parents use the LightAide to meet learners' needs?
- 3) What are benefits of LightAide use?
- 4) What are the barriers and challenges to LightAide use?

## Research Design

The mixed methods research design (Creswell & Plano Clark 2007; Johnson & Onwuegbuzie 2004; Johnson, Onwuegbuzie, & Turner 2007) used for the study builds on the methodology TERC has established for similar studies. It was coordinated and conducted by TERC with teachers and parents who were solicited from a list of individuals who had purchased the LightAide. Purposeful sampling (Palinkas, Horwitz, Green, Wisdom, Duan & Hoagwood 2013) resulted in the selection of users who had either been implementing the device in a classroom or home during the current school year for a short period of time or who had been implementing it for a longer period that included repeated use during the prior and current year.

Data collection methods included: 1) soliciting parents and teachers; 2) gathering responses to an online survey; and 3) conducting follow-up interviews with a sub-set of parents and teachers who responded to the survey. A link to the online survey was sent to teachers and parents who expressed interest in participation, along with an introductory note that described the study protocols. Additionally, a subset of teachers and parents were interviewed by phone using a set of interview questions customized to elicit more specific information about, or further clarify, participants' responses to the online survey.

Instrumentation: The research instruments used for data collection are described below. A copy of each instrument is included in the Appendix. Upon completion, the data collected from the instruments were entered into spreadsheets, cleaned, and analyzed.

LightAide Implementation Online Survey for Teachers— provides information about the educational setting, student demographics, classroom implementation of the LightAide package and about the benefits and challenges to educational use. It also solicits suggestions for improvement.

LightAide Implementation Online Survey for Parents— provides information about the home setting, child demographics, implementation of the LightAide package, and benefits and challenges to home use. It also solicits suggestions for improvement.

Interview Form— provides additional, more specific information about LightAide implementation based on select user's responses to the implementation surveys.

## Results

### **Research Question 1: What are the characteristics of LightAide users?**

Twelve teachers and seven parents responded to the Online Survey. Table 1 describes the teachers; Table 2 describes the students; and Table 3 describes the home learners. Two teachers, designated in Table 1 as Teacher 7 and Teacher 8, and two parents, designated in Table 3 as Parent 1 and Parent 2, were interviewed.

**Table 1. Characteristics of Teachers**

Teacher	Role	State	Location	Setting
1	TVI* (District)	MA	Urban	Public School
2	TVI	VA	Suburban	Public School
3	Vision Resource Services Consultant	Ontario, Canada	Suburban	Specialized School for the Blind/VI**
4	Classroom Teacher	MA	Suburban	Pediatric Nursing Home
5	Classroom Teacher	MA	Suburban	Specialized School for Students with Disabilities
6	Classroom Teacher	N/A	N/A	Specialized School for the Blind/VI
7	Classroom Teacher	MI	Suburban	Specialized School for Students with Disabilities
8	Itinerant Classroom Teacher	TN	Urban	Public School
9	Itinerant Classroom Teacher	OR	Urban	Public School
10	Itinerant Teacher	MA	Suburban	Specialized School for the Blind/VI
11	Itinerant Teacher	MI	Suburban	Public School
12	Technology Teacher	MA	Suburban	Specialized School for the Blind/VI

\*Teacher of the Visually Impaired

\*\* Visually Impaired

**Table 2. Characteristics of School Learners**

Teacher	Age Range	Grade Range	Primary Disabilities
1	0-8	Preschool-grade 3	Visual Impairment, (VI); Cortical Visual Impairment (CVI); Severe Multiple Impairment (SMI); Cerebral Palsy (CP); Cognitive delay; Hearing Impairment
2	0-12	Preschool-grade 8	VI; CVI; SMI; CP; Cognitive delay; Hearing Impairment
3	0-18+	Preschool-grade 12+	VI; CVI; SMI; DeafBlind
4	5-16	K- grade 12	VI; CVI; SMI; CP; Cognitive delay; Hearing Impairment
5	16-18+	Grade 9-grade 12	VI; CVI; SMI; CP; Cognitive delay; Hearing Impairment
6	0-5	Pre-school - Pre-K	VI; CVI; SMI; CP; Cognitive delay
7	0-8	Preschool-grade 3	VI; CVI; SMI; CP; Cognitive delay; Hearing Impairment
8	0-18+	Preschool-grade 12+	VI; CVI; SMI; CP; Cognitive delay; Hearing Impairment
9	0-8	Preschool-grade 3	CVI; SMI
10	0-18+	Preschool-grade 12+	VI; CVI; SMI; CP; Cognitive delay; Hearing Impairment
11	0-5	Preschool-Pre-K	SMI
12	0-8	Preschool-grade 3	VI; CVI; SMI; CP; Cognitive delay

**Table 3. Characteristics of Home Learners**

Parent	Age Range of Learner	Grade Range of Learner	Primary Disabilities
1	0-5	Preschool - Pre-K	Hearing Impairment; Other (Chromosomal abnormalities, hypotonia, cleft lip palate, processing delays, developmental disabilities)
2	0-5	Preschool - Pre-K	Cortical Visual Impairment (CVI); Cerebral Palsy (CP)
3	0-5	<Preschool	CVI
4	5-8	K- grade 3	CVI; Cognitive delay
5	13-16	K- grade 3	CVI; CP; Cognitive delay
6	16-18+	> Grade 12	CVI; CP
7	9-12	K- grade 3	CVI; Severe Multiple Impairment (SMI); Cognitive delay

### Research Question 2: How do teachers and parents use the LightAide to meet learners' needs?

Teacher and parent responses to the online survey provided information about how the LightAide was being used at school and at home. At school, almost half of the teachers had been using the LightAide for more than one year. The other half had been using it for less than six months. The majority of teachers typically set up one LightAide on a desk or table, and occasionally on the floor for use with one student at a time. One teacher used two LightAides, and two teachers used the LightAide with more than one student at a time.

Frequency of use ranged from daily to once a month. Most teachers used the LightAide daily or every other day. Others used it more infrequently. Three teachers said they typically used the LightAide from fifteen to thirty minutes at a time. Four teachers said they used it for fifteen minutes or less. Only two teachers indicated that they used the LightAide for more than thirty minutes at a time. Additional information about school use of the LightAide is provided in Table 4.

Only one parent had been using the LightAide at home for less than six months. The other six parents had been using it for more than a year. All of the parents had purchased only one LightAide. They typically set it up on a desk or table, and occasionally the floor, for one-on-one use with their child. One parent said that they used the LightAide with their child, and the child's sibling. Frequency of use ranged from daily to once a month with most parents using the device weekly. Most parents said that they typically used the LightAide for between fifteen and thirty minutes at a time. Additional information about school use is provided in Table 5.

**Table 4. Use of the LightAide™ at School**

Teacher	# of Units	Set-up Location	Duration of Use	Frequency of Use	Time Used at a Single Sitting	Configuration of Users
1	1	Desk/Table	< 1 month	Daily	N/A	Student with an adult
2	2	Desk/Table/Floor*	> 1 year	Daily	>30	Student with an adult
3	1	N/A	< 1 month	N/A	N/A	N/A
4	1	Desk/Table/Floor	3-6 months	Weekly	N/A	Student with an adult
5	1	Desk/Table	1-3 months	Every other week	15-30	Student with an adult and at least one other student
6	1	Desk/Table	3-6 months	Every other week	<15	Student with an adult
7	1	Desk/Table**	> 1 year	Every other day	15-30	Student with an adult

8	1	Desk/Table	< 1 month	Every other day	>30	Student with an adult
9	1	Desk/Table	< 1 month	Every other day	<15	Student with an adult
10	1	Desk/Table	> 1 year	Weekly	15-30	Student with an adult
11	1	Floor	> 1 year	Daily	~15	Student with at least one other student
12	1	Desk/Table	> 1 year	Weekly	<15	Student with an adult

\* On a wheelchair tray    \*\* Securely attached to a mobile cart on wheels

**Table 5. Use of the LightAide™ at Home**

Parent	# of Units	Set-up Location	Duration of Use	Frequency of Use	Time Used at a Single Sitting	Configuration of Users
1	1	Desk/Table/Floor	1-3 months	Every other day	<15	Child with an adult
2	1	Floor	> 1 year	Daily	15-30	Child with an adult
3	1	Desk/Table	> 1 year	Every other week	<15	Child with an adult
4	1	Desk/Table	> 1 year	Weekly	15-30	Child with an adult
5	1	Desk/Table	> 1 year	Weekly	~15	Child with an adult
6	1	Attached to a REHADapt wheelchair mount.	> 1 year	Once per month	15-30	Child with an adult
7	1	Floor	> 1 year	Weekly	15-30	Child with an adult and at least one other child

Teachers and parents provided information about how, and for what purposes, they used the LightAide in their particular setting. Teachers primarily used the LightAide to practice or work on visual attention and tracking light with their students. For these purposes, teachers typically identified and implemented LightAide activities that displayed a single light or objects that moved across the screen in different directions and configurations and observed their students' ability to attend to and track the light. Several teachers used the LightAide to help students learn or review mathematics and English Language Arts (ELA) content, or Expanded Core Curriculum (ECC) (American Foundation for the Blind 2013) skills. For these purposes teachers identified and implemented LightAide activities to expose students to numbers, letters, colors and shapes. In some instances teachers used specific LightAide activities to help their students practice or work on using a switch, and to interact with others by playing games or taking turns. Other teachers set up the device for their students to keep occupied or relax independently by viewing programs that display lights that change color and move automatically, without switch operation. Additional information about how teachers used the LightAide to meet the needs of their students at school is provided in Table 6 below.

At home, all parents indicated that they use the LightAide to help their child practice or work on visual attention. All except for two parents said that they also used the LightAide to work on or practice tracking light. These parents typically worked one-on-one with their child to identify engaging LightAide activities that encourage their child to attend to and track light for short periods of time. Only one parent said that they used the LightAide to learn mathematics or ELA content and ECC skills. Several parents said that they integrate the LightAide into therapy or "playtime" by using it to play games or interact with their child. Additional information about

how parents used the LightAide to meet the needs of their children at home is provided in Table 7 below.

**Table 6. Meeting Users' Needs at School**

<b>Teacher</b>	<b>Purpose of Use</b>	<b>Implementation Strategy</b>
1	Practice/work on visual attention; Practice/work on tracking light; Play games	- Student uses the switch to "make the rainbow." - Student counts and/or recites the alphabet while using some songs paired with an iPad.
2	Practice/work on visual attention; Practice/work on tracking light; Keep occupied; Relax; Practice/work on cause and effect	- For CVI students - Begin with the colors to get them focused, then progress to tracking activities. - For higher students - Students use the switch to activate the LA and find the first letter of their name or the number or letter that corresponds to a letter or number they are presented with. - Students predict the weather and tell their mood for the day using the LightAide during a "calendar activity."
3	Purchased for assessment purposes, but determined not appropriate for that use (given to Deafblind program)	N/A
4	Practice/work on visual attention; Practice/work on tracking light; Keep occupied; Relax	- Student uses a switch attached to change the lights independently.
5	Practice/work on tracking light; Practice/work on switch use; Practice/work on cause and effect	- Student tracks columns
6	Practice/work on visual attention; Practice/work on tracking light; Practice/work on switch use; Practice/work on cause and effect	N/A
7	Learn or review mathematics content; Learn or review English Language Arts content; Learn or review Expanded Core Curriculum (ECC) skills; Play games; Practice/work on visual attention; Practice/work on tracking light; Keep occupied; Relax	- Teacher works one-on-one with an individual student with the main goal of increasing visual attending skills. - Teacher uses the LightAide as an additional writing tool during a whole class activity.
8	Learn or review mathematics content; Learn or review English Language Arts content; Learn or review Expanded Core Curriculum (ECC) skills; Play games; Practice/work on visual attention; Practice/work on tracking light	- For CVI student - Teacher uses the LA to get the student to look and maintain visual attention for several seconds. Then progress to tracking lights/shapes/objects moving across the screen. Incorporate using the switch to teach cause and effect and taking turns. - For student that is blind with light perception - Use the LA to teach math concepts and give a new dimension to concepts learned through braille and other tactile media. Work on comparing lines of various heights and lengths, and also comparing and matching shapes.
9	Practice/work on visual attention; Practice/work on switch use; Interact with other students, Learn names of shapes and colors	- Student is taken to learning center (for quiet and less visual clutter) and the LightAide is set up on table. Student is in wheelchair. Student is verbally prompted, then teacher waits for latency time (about 1 min), and student hits switch with either head or hand to activate machine. - Two students use the LightAide together to play the "take-turns" activity.
10	Practice/work on visual attention;	- Students use the LightAide to work on visual attention

	Practice/work on tracking light; Relax	or fixation objectives.
11	Practice/work on visual attention; Practice/work on switch use	- Students alternate using a switch while 3-4 students are interacting via watching the LightAide during "center time."
12	Practice/work on visual attention; Practice/work on tracking light	- Teacher uses the LightAide to identify and select the student's preferred color. Teacher then covers and uncovers the LightAide to determine if the student can see the light. - For student working on tracking, teacher and student take turns controlling the switch and manipulating the speed of the dot or line moving during the different tracking activities. Occasionally, teacher covers the screen, moves the dot, and asks the student to locate it.

**Table 7. Meeting Users' Needs at Home**

Parent	Purpose of Use	Implementation Strategy
1	Practice/work on visual attention; Practice/work on tracking light; Practice/work on cause and effect; Keep occupied;	The child sits on a therapy ball next to a table with the LightAide on it. The parent finds the activity on the LightAide that the child seems to engage in the most, and uses hand over hand help the child use the switch and track the light for no longer than five minutes.
2	Practice/work on visual attention; Practice/work on tracking light; Keep occupied; Relax	The parent sets the LightAide up in a dark part of the house daily, and the parent and child progress through doing several activities together starting with the color wall, and then moving on to lines and shapes.
3	Practice/work on visual attention; Practice/work on tracking light	Use the LightAide to identify colors for a few minutes at a time.
4	Learn or review mathematics content; Learn or review English Language Arts content; Learn or review Expanded Core Curriculum (ECC) skills; Practice/work on visual attention; Practice/work on tracking light; Keep occupied	Use the LightAide for interactive learning of cause and effect; to do varied activities for visual therapy, the alphabet and number activities, and practice sequencing and organizational skills.
5	Practice/work on visual attention; Practice/work on tracking light	Use the LightAide to do different tracking activities.
6	Practice/work on visual attention; Play games	Use the LightAide to play games and have fun.
7	Learn or review mathematics content; Practice/work on visual attention; Keep occupied; Practice/work on turn taking;	Parent uses the LightAide to interact with child for educational/therapy time and playtime.

### **Research Question 3: What are benefits of LightAide use?**

Whether it was used at school or at home, both teachers and parents were in agreement about the features of the LightAide package that make it a beneficial tool to help them meet the needs of learners. In particular, parents and teachers were in agreement that the large size of the device and the bright, colored LED light display with a black background, made the device ideal for use with learners with low vision, especially those with CVI. Additionally, they agreed that the switch activation and operation, as well as the variety of activities made it useful for learners with a wide range of needs. They also liked the device being lightweight, durable and easy to transport.

Teachers and parents identified activities that were most beneficial to them based on their students' or child's needs and abilities, and the particular skill or content that they were "working on" at school or at home. Those teachers and parents who were primarily using the device to



assess or practice learners’ ability to track light, found activities such as Track the Column, Track the Row, and Track a Spot, as well as others in the Visual Efficiency Activity Sets such as Build Squares of Light and Make a Rainbow particularly useful. Those teachers and one parent who were using the LightAide to teach mathematics and ELA concepts preferred activities such as Identify the Bold Uppercase and Lowercase Letters, Read Sight Words, Read Rhyme Words, Form Consonant-Vowel-Consonant Words, Learn the Numbers, Identify the Shape, and Compare Lines of Different Lengths. To teach ECC skills, teachers and one parent used activities such as Identify the Color and Learn Directions. Several teachers said that any activity that required students to use a switch to operate the device was helpful for working on cause and effect. One teacher mentioned that the Take Turns activity was particularly helpful. One parent liked the Watch the Colors Change activity to help her child to relax while attending to light, while several other parents preferred activities in the Game Activity Set, and “fun” activities such as Make and Pop Bubbles, for therapy and playtime at home.

With regard to the overall benefits of the LightAide, teachers and parents said that the most obvious benefit of use is that the LightAide package provides an appropriate amount of visual stimulation and increases learners ability to attend to light for the purposes of tracking and learning math and ELA concepts and/or ECC skills. The switch operation provides an opportunity for individual or group interactivity with the device, and the variety of activities allows for differentiation of instruction for all students. An additional benefit is that the LightAide is engaging, motivating and fun and is a useful tool for therapy, group or individual academic instruction, or relaxation at home or at school. Additional information about the benefits of using the LightAide at school is provided in Table 8 below. Additional information about the benefits of using the LightAide at school is provided in Table 9 below.

**Table 8. Benefits of LightAide Use at School**

<b>Teacher</b>	<b>Beneficial Features</b>	<b>Beneficial Activities</b>	<b>Benefits of Use</b>
1	- Large light display - Ability to change the presets to certain colors/combinations	- Switch activated - Cause and effect	- Increase in visual attention for my students with very low vision. - Being able to expose students with multiple disabilities to ELA and mathematics content.
2	- LED light display - Black construction with choice of different lenses - Array of activities and their simplicity	- Starter Set - Visual 1 - ECC	- Meets the needs of students who need more than what a Lightbox can offer - Best mode of presentation for students with a wide range of disabilities that affect vision.
3	N/A	N/A	N/A
4	- Bright, colored lights	N/A	- Provides visual stimulation - Students can use it independently via their switches.
5	- Light source with switch activation/operation	- Track the Column	- Interactivity and/or ability to manipulate a light source for students who have some vision.
6	- Bright lights - Switch activation/operation	N/A	- Students can visually attend to the bright lights and practice the cause and effect switch usage.
7	- Durable - Can be used in a lighted classroom	- Identify the Bold Upper and Lower Case Letters	- Supplements all our visual stimulation/CVI training activities. - Switch activation provides student

	<ul style="list-style-type: none"> <li>- Can be used with multiple students</li> <li>- Switch activation/operation</li> </ul>	<ul style="list-style-type: none"> <li>- Learn the Numbers</li> <li>- Make a Rainbow</li> </ul>	independence.
8	<ul style="list-style-type: none"> <li>- High contrast between the bright lights and black background</li> <li>- Durable</li> <li>- Lightweight/Portable</li> <li>- Easy to set up and use</li> </ul>	<ul style="list-style-type: none"> <li>- Compare Lines of Different Lengths</li> <li>- Read Sight Words</li> <li>- Read Rhyme Words</li> <li>- Form Consonant-Vowel-Consonant Words</li> </ul>	<ul style="list-style-type: none"> <li>- Student with light perception can use it to work on academic skills.</li> <li>- Provides student with a whole new level of understanding that can only be achieved with visual input.</li> <li>- Wonderful tool to use when conducting a Functional Vision Assessment.</li> <li>- Students enjoy using it and they learn while having fun.</li> </ul>
9	<ul style="list-style-type: none"> <li>- Lights</li> <li>- Size/Big screen</li> <li>- Lightweight/Portable</li> <li>- Number and variety of activities</li> </ul>	<ul style="list-style-type: none"> <li>- Taking Turns</li> <li>- Identify the Shape</li> </ul>	<ul style="list-style-type: none"> <li>- Intentional switch use</li> <li>- Visual attention</li> <li>- Student interaction</li> <li>- Students can learn names of shapes and colors</li> </ul>
10	<ul style="list-style-type: none"> <li>- Bumpy lens</li> <li>- Large size</li> </ul>	N/A	<ul style="list-style-type: none"> <li>- Serves as a great large target for students with low vision to view.</li> </ul>
11	<ul style="list-style-type: none"> <li>- Switch activation/operation</li> <li>- Variety of activities</li> </ul>	N/A	<ul style="list-style-type: none"> <li>- Students that are not often independent can utilize the LightAide independently.</li> </ul>
12	<ul style="list-style-type: none"> <li>- Very Bright</li> <li>- Switch activation/operation</li> </ul>	<ul style="list-style-type: none"> <li>- Identify the Shape</li> <li>- Identify the Color</li> <li>- Tracking Activities</li> </ul>	<ul style="list-style-type: none"> <li>- Teachers can customize and individualize use for their students.</li> </ul>

**Table 9. Benefits of LightAide Use at Home**

Parent	Beneficial Features	Beneficial Activities	Benefits of Use
1	<ul style="list-style-type: none"> <li>- Size</li> <li>- Visually stimulating</li> <li>- Touchable without heat</li> <li>- Versatility (can be used alone, one on one, or with friends).</li> </ul>	<ul style="list-style-type: none"> <li>- Build Squares of Light</li> </ul>	<ul style="list-style-type: none"> <li>- Cause and effect is simple and clear (push, result, push, result).</li> <li>- Student can focus on the activity with no distractions - i.e. nothing is blinking, making noise, or going out of the field of vision.</li> </ul>
2	<ul style="list-style-type: none"> <li>- Lights</li> </ul>	<ul style="list-style-type: none"> <li>- Watch the Colors Change</li> <li>- Track the Column/Row</li> </ul>	<ul style="list-style-type: none"> <li>- Child's visual attention span has gotten much longer with prolonged use.</li> </ul>
3	<ul style="list-style-type: none"> <li>- Size/Large screen</li> </ul>	<ul style="list-style-type: none"> <li>- Identify the Color</li> </ul>	<ul style="list-style-type: none"> <li>- Child can now identify colors on the LightAide</li> </ul>
4	<ul style="list-style-type: none"> <li>- ELA and Mathematics Activity Sets</li> </ul>	<ul style="list-style-type: none"> <li>- Upper and Lower Case Letters</li> <li>- Learn Directions</li> <li>- Sight Words</li> </ul>	<ul style="list-style-type: none"> <li>- Child can focus on educational tasks such as learning to identify letters and letter sounds.</li> <li>- Use of the light enhances learning.</li> </ul>
5	<ul style="list-style-type: none"> <li>- Colorful</li> </ul>	<ul style="list-style-type: none"> <li>- Track the Column/Row</li> <li>- Track the Spot</li> </ul>	<ul style="list-style-type: none"> <li>- Visual stimulation</li> </ul>
6	N/A	<ul style="list-style-type: none"> <li>- Games</li> </ul>	<ul style="list-style-type: none"> <li>- Work on and improve visual attention while having fun</li> </ul>
7	<ul style="list-style-type: none"> <li>- Versatility (use for body movement, eye tracking, play, education, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Games</li> <li>- Make a Rainbow</li> <li>- Make and Pop Bubbles</li> </ul>	<ul style="list-style-type: none"> <li>- Visual awareness and stimulation</li> </ul>

**Research Question 4: What are the barriers and challenges to LightAide use?**

While the majority of the teachers and students surveyed found the LightAide package useful, they experienced some barriers and challenges with the LightAide device itself, and its implementation, as well as with the additional activities available for purchase. More than half

of the teachers, and one parent mentioned that it is problematic that the device does not have a power button or On/Off switch. This was a problem especially for teachers and parents that wanted to turn the device on and have it remain on for long periods of time in order for a child to engage in a LightAide activity on their own. It was also cumbersome for them to have to plug the device in before, and unplug it after, every use. Several teachers and one parent said that they experienced issues with the LCD control panel on the side of the device being difficult to use, and that the location of it is awkward and difficult to access easily during use. Another barrier to use mentioned by several teachers and one parent is the high cost of the LightAide package and the additional activity sets. With regard to the activity sets, teachers felt that it was problematic that the activity sets cannot be "shared" between LightAide's and the number of activities they are allowed or able to download onto the LightAide is limited. Three teachers also mentioned that some of the LED light displays, especially shapes and colors were inaccurate, blurry or difficult for students to discern. One parent said that the user guide and activity guides available for download were not user friendly enough and did not provide enough guidance and information that was specific for home use. Additional information about the barriers and challenges that teachers encountered when using the LightAide at school is provided in Table 10 below. Additional information about the barriers and challenges that parents encountered when using the LightAide at home is provided in Table 11 below.

**Table 10. Barriers and Challenges to LightAide Use at School**

Teacher	Barriers and Challenges
1	<ul style="list-style-type: none"> <li>- Switch wires tangle easily</li> <li>- Left side location of the LCD control panel is problematic. It would be easier if it was linked to something that could make it wireless</li> </ul>
2	<ul style="list-style-type: none"> <li>- No power button</li> <li>- Activity sets cannot be shared between LightAide's so in order to do a different activity we have to swap out the device.</li> </ul>
3	<ul style="list-style-type: none"> <li>- No power button</li> <li>- Cumbersome to carry</li> <li>- Too bright</li> <li>- Pixilation poor</li> <li>- LCD control panel on the left side is awkward and difficult to access</li> <li>- It needs a remote control</li> <li>- Cost of LightAide is too high</li> <li>- Cost of additional LightAide activities is too high</li> </ul>
4	<ul style="list-style-type: none"> <li>- It can be hard to get the settings to change</li> </ul>
5	<ul style="list-style-type: none"> <li>- No power button</li> </ul>
6	<ul style="list-style-type: none"> <li>- It has pixel images that are abstract</li> </ul>
7	<ul style="list-style-type: none"> <li>- Cost of the LightAide is too high</li> </ul>
8	<ul style="list-style-type: none"> <li>- No barriers or challenges</li> </ul>
9	<ul style="list-style-type: none"> <li>- No power button</li> <li>- Device returns to default when unplugged</li> <li>- Additional activities are needed, at a lower cost</li> <li>- Better user manual online</li> <li>- Ability to download multiple student's activities on one machine</li> </ul>
10	<ul style="list-style-type: none"> <li>- Changing switch ports is cumbersome, especially in a dark room.</li> </ul>
11	<ul style="list-style-type: none"> <li>- Cost of the LightAide is too high</li> </ul>
12	<ul style="list-style-type: none"> <li>- Shapes, letters, and other picture activities are extremely difficult for a sighted person to determine, let alone a student with visual and multiple impairments.</li> <li>- Limited options for the user, especially in the more simplistic activities such as tracking.</li> </ul>

	<ul style="list-style-type: none"> <li>- Add an option to get rid of the color behind the color selected for tracking (the tail).</li> <li>- Lights appear blurry to some students with the flat lens, and when looking at it from the side</li> <li>- The colors should be improved. There are several pale pink, and the yellow is very green. This is confusing for students working on these early skills.</li> </ul>
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**Table 11. Barriers and Challenges to LightAide Use at Home**

<b>Teacher</b>	<b>Barriers and Challenges</b>
1	<ul style="list-style-type: none"> <li>- No power button</li> <li>- Need more age specific or developmental specific activity sets. The expensive activity sets are only half useful at a given age/development.</li> <li>- User guide is not user friendly for parents. It would be better if it had guidelines for practical sessions, and ways to use.</li> </ul>
2	- Cost of additional LightAide activities is too high
3	- My child's attention span is short. Perhaps more interesting activities would help.
4	- Challenges have occurred with the LCD control panel on the side and maneuvering between LA activities.
5	- No barriers or challenges
6	- No barriers or challenges
7	- If we could only make switches that were indestructible! I worry about them far more than the actual device.

### **Key Findings**

The findings reported here are based on feedback from a small sample of teachers and parents, who implemented the LightAide package with learners at school and in the home for a limited amount of time, begin to show that the device and supporting materials have the potential to be a useful assistive tool for young children with a wide range of visual impairments as well as those with other physical and cognitive disabilities. It appears that the LightAide is particularly beneficial for pre-school through early elementary school age students with CVI and is easily integrated into academic instruction and therapy in both academic and home settings. The LightAide is most promising for these learners because: 1) It provides an appropriate amount of visual stimulation and increases learners' ability to attend to light for the purposes of tracking and learning math and English language arts concepts and ECC skills. 2) The switch operation provides an opportunity for individual or group interaction with the device. 3) The variety of activities allows for differentiation of instruction for members of this audience. 4) It is engaging, motivating and fun.

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## Appendix

### LightAide Implementation Online Survey for Teachers

#### 1. Teacher Purchaser Information

- \* First name
- \* Last name
- \* Email

#### 2. Name and Address of School or District

#### 3. Classification of School

- Urban
- Suburban
- Rural

#### 4. What best describes your role as a teacher of the visually impaired?

- Classroom Teacher
- Itinerant Classroom Teacher
- Classroom Aide
- Classroom Volunteer
- Therapist
- Other (Specify)

#### 5. Type of School/Setting

- Public School, Regular Classroom
- Public School, Regular Special Education Classroom
- Specialized School for the Blind/Visually Impaired
- Specialized School for Students with Disabilities
- Private School
- Other (Specify)

#### 6. Which of the following best describes your LA use?

- I used the LA with my student(s) last year, but I am not using it this year.
- I used the LA with my student(s) last year, and I am continuing to use it this year.
- I just started using the LA this year.

#### 7. Age Range of Last Years Students (2013-2014) - Check all that apply

- 0-5
- 5-8
- 9-12
- 13-16
- 16-18+

#### 8. Grade Level of Last Year's Students (2013-2014) - Check all that apply

- Preschool/Pre-K
- K-3
- 4-6
- 7-8
- 9-12
- >12

#### 9. Primary Disabilities of Last Years Students (2013-2014) - Check all that apply

- Visual Impairment
- Cortical Visual Impairment (CVI)

Severe Multiple Impairment (SMI)  
Cerebral Palsy (CP)  
Cognitive Impairment/Delay  
Hearing Impairment

10. Number of LightAides Used Last Year (2013-2014)

1  
2  
3  
4  
5+

11. Frequency of Light Aide Use Last Year (2013-2014)

daily  
every other day  
weekly  
every other week  
once per month

12. Typical Duration of Classroom Use Last Year (2013-2014)

<15 minutes  
~ 15 minutes  
15-30 minutes  
>30 minutes

13. How did students typically use the LA last year (2013-2014)?

alone  
with an adult  
with an adult and at least one other student  
with at least one other student

14. How did you typically set up the LA for use last year (2013-2014)? - Check all that apply

on a floor  
on a desk or table  
attached to a wall  
Other (Specify)

15. What were your goals and objectives for LA use last year (2013-2014)? - Check all that apply

learn or review mathematics content  
learn or review English Language Arts content  
learn or review Expanded Core Curriculum (ECC) skills  
play games  
practice/work on visual attention  
practice/work on tracking light  
keep occupied  
relax  
Other (Specify)

16. Last year (2013-2014), what were your instructional or educational goals for integrating the LA into your teaching? For example, when you used the LA, what concepts, skills or outcomes did or do you anticipate would be learned or achieved?

17. Please describe a typical LA lesson or use of the LA in your classroom last year (2013-2014).

18. Please list the activities or activity sets that you found particularly useful last year (2013-2014). Explain why and in what ways each of the activities or activity sets were useful.

\* Questions 7-18 above are repeated for users to provide information about this years use.

*Experiences and Recommendations*

1. What are the specific features of the LA and associated activities that make it useful with regard to your teaching and student's learning?
2. In your opinion, what are the overall benefits of LA use for you and your students?
3. What are some examples of challenges or barriers that you have encountered with using the LA?
4. Based on your experience with the LA would you recommend your school and/or district purchase additional devices?  
Yes  
No

Additional comments:

**LightAide Implementation Online Survey for Parents**

1. Parent Purchaser Information

- \* First name
- \* Last name
- \* Email

2. Which of the following best describes your LA use?

I purchased the LA last year and used it with my child, but we are no longer using it.

I purchased the LA last year, and continue to use it with my child this year.

I recently purchased the LA and have been using it with my child for less than a year.

3. How old is your child?

- 0-5
- 5-8
- 9-12
- 13-16
- 16-18+

4. What is your child's grade level?

- < Preschool
- Preschool/Pre-K
- K-3
- 4-6
- 7-8
- 9-12
- >12

5. What are your child's primary disabilities? (Check all that apply)

- Visual Impairment
- Cortical Visual Impairment (CVI)
- Severe Multiple Impairment (SMI)
- Cerebral Palsy (CP)
- Cognitive Impairment/Delay
- Hearing Impairment
- Other (Specify)

6. How often did you and/or your child use the LightAide last year?  
daily



every other day  
weekly  
every other week  
once per month

7. What was the typical duration of LightAide use last year?

<15 minutes  
~ 15 minutes  
15-30 minutes  
>30 minutes

8. How did your child typically use the LA last year?

alone  
with an adult  
with an adult and at least one other child  
with at least one other child

9. How did you typically set up the LA for use last year? (Check all that apply)

on a floor  
on a desk or table  
attached to a wall  
Other (Specify)

10. What were your goals and objectives for LA use last year? (Check all that apply)

learn or review mathematics content  
learn or review English Language Arts content  
learn or review Expanded Core Curriculum (ECC) skills  
play games  
practice/work on visual attention  
practice/work on tracking light  
keep occupied  
relax  
Other (Specify)

11. Last year, what were your goals for using the LA? For example, when you used the LA, what concepts, skills or outcomes did or do you anticipate would be learned or achieved?

12. Please describe a typical LA use session in your home last year?

13. Please list the activities or activity sets that you found particularly useful last year. Explain why and in what ways each of the activities or activity sets were useful.

\* Questions 6-13 above are repeated for users to provide information about this years use.

#### *Experiences and Recommendations*

1. What are the specific features of the LA and associated activities that make it useful with regard to your child's learning?

2. In your opinion, what are the overall benefits of LA use for you and your child?

3. What are some examples of challenges or barriers that you have encountered with using the LA?

4. Based on your experience with the LA would you recommend it to other parents?

Yes  
No

Additional Comments:

### **LightAide Implementation Study Interview Form**

#### I. Needs of Students and How the LA serves those needs

##### SAMPLE QUESTIONS/PROMPTS

- 1) On the survey you said that your child/students have \_\_\_\_\_ disabilities. Could you explain how the features of the LA specifically meet their needs (and/or ways in which it doesn't)?
- 2) Which LA activities (in the starter set or what you have ordered) are best for your child/students needs? why?

#### II. Implementation

##### SAMPLE QUESTIONS/PROMPTS

- 1) Can you tell me a bit more about how you typically use the LA with your child/student? Has that changed over time? How?
- 2) Choose an example of an effective LA use session and describe what you did, what the student/child did, evidence of learning/progress?
- 3) Did/do you use the Activity Guides (downloadable) when you use the LA with your child/student? If so, what are your likes/dislikes with regard to the guides? Are they helpful?

#### III. Benefits/Outcomes

##### SAMPLE QUESTIONS/PROMPTS

- 1) On the survey you said that your goals/objectives for using the LA with your students/child were \_\_\_\_\_. Could you tell me about ways in which you have implemented the LA to address these goals, and what results you observed (evidence of engagement, learning, and or skill improvement, etc.)
- 2) If you indicated that you use to LA to teach mathematics and or ELA concepts, how and in what ways do you use the LA to address these goals/objectives?

#### IV. Barriers/Challenges and Improvements

##### SAMPLE QUESTIONS/PROMPTS

- 1) What suggestions do you have that would improve the LA package? What activities would you
- 2) On the survey you mentioned that you would like \_\_\_\_\_. Could you tell me more about this? What would these materials/activities "look like" or do to best meet the needs of your student/child?