

Creative and Constructive Play with Light

Presented by
Krissy Opferman & Charline Tomer
CMU Children's School

PAEYC Conference on Play!
September 21, 2012

Big Ideas for Light

Central concepts to learn

- We need light to see things.
- Without light, we would not be able to see color.
- White light is made up of all colors.
- Rainbows occur when white light is split apart.
- Primary light colors are different from primary pigment colors. This is because light colors are direct (light from a light source), pigment colors are reflected (light hitting an object).



Visual of paint mixing vs. light mixing



Color Mixing



Light Mixing

Big Ideas for Light

Central concepts to learn

- We need light to see things.
- Without light, we would not be able to see color.
- White light is made up of all colors.
- Rainbows occur when white light is split apart.
- Primary light colors are different from primary pigment colors. This is because light colors are direct (light from a light source), pigment colors are reflected (light hitting an object).
- Light travels in a straight line.
- You can block light to make shadows.
- Shadow sizes vary depending on how near or far the object is from the light source.
- Light goes through some things but not others (transparent, translucent, opaque).
- Some things reflect light. Some things refract light.



Light Vocabulary



Traveling Light-

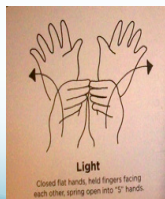
- absorb- to take in or swallow up
- ray- a narrow beam of light
- reflects- stops light wave and changes direction, bounces back (mirror)
- refracts- slows light waves and changes direction (prism)
- shadow-a dark shape caused by an object blocking light
- silhouette-a drawing of an outline of an object
- opaque-no light comes through (blocks light)
- translucent-lets some light through (slows light)
- transparent-lets all light through

Light Colors-

- primary- red, blue, green
- secondary- cyan, yellow, magenta
- florescent- glows in ultra-violet light
- white light- combination of all light colors
- black light- ultra-violet light (past violet on the color spectrum)

Diversity & Adaptations

- Teach words in other languages for key vocabulary.
- Teach sign language for key vocabulary.



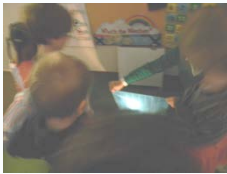
Overview of Light Play

- **Engage** children in inquiry experiences with light.
 - circle time activities
 - learning center ideas
- **Explore** light play through a simple Black Light Lab.
 - space
 - materials
 - process
- **Experience** white light using an interactive computer program to enhance children's light play through shadows, mixing colors and sight.
 - background of the White Light Unit
 - curriculum
 - lending opportunity

7


Circle Time

Focus Activities



- Brainstorm sources of light- What gives us light?
- Discuss light sources in daytime vs. nighttime.
- Discuss how light waves travel in a straight line.
- Share books such as:
 - Day Lights, Night Lights by Cecile Schoberle
 - Guess Whose Shadow by Stephen Swineburne

- What Makes a Shadow by Clyde Robert Bulla
- Light and Dark by Terry Jennings
- Light and Color by Peter Riley



- Predict, using a shadow screen, what an object is by its shadow.
- Show how light bends (refracts) going through water by placing a pencil in a clear glass of water.
- Discuss transparent(eye glasses ,laminat, saran wrap), translucent (wax paper, light fabric ,tracing paper) and opaque (book, cardboard, piece of wood). Have children identify objects with these properties.
- Predict what materials light will pass through. Use flashlights to test the predictions.
- Experiment with mixing light and observe the differences between mixing paint and mixing light. Mixing paint creates a muddy brown or black. Mixing light creates white light.

- Experiment with where someone has to stand and how she/he has to move a mirror to hit a target with beam of light.
- Try light exploration on overhead projector.



Songs

- *This Little Light of Mine*
- *Chelsea Morning*- Joni Mitchell
- *Sunny Skies*- James Taylor
- *Somewhere Over the Rainbow*
- *Rainbow Connection*- Paul Williams and Kenneth Asher
- *It's Not Easy Being Green*- Jon Raposo

Center Ideas for Light

- Science
- Light Table
- Dramatic Play
- Water Table
- Art
- Blocks
- Outdoor Classroom
- Technology

Center Ideas - Science

- Create a science area: add kaleidoscopes, lava lamps, prisms, flashlights, variety of materials for light to pass through, mirrors, magnifying glass, binoculars.
- Make rainbows with prisms
- Place a small mirror in a glass bowl of water so that the mirror rests against the side of the bowl. Set the bowl in direct sunlight to make a rainbow.



Center Ideas - Science

- Put an object in water. As light slows down it refracts. It makes the object look as though it is broken or bent.



Center Ideas - Light Table

- Fill bottles with different colors of water and then have flashlights for the children to shine through the bottles.
- Put up mirrors on three sides of the light table so that children can see reflections and patterns.
- Sort transparent, translucent, and opaque objects- glass pebbles, stones, cellophane, tissue paper.
- Build with transparent Legos, transparent/translucent cups and plates.



Center Ideas – Dramatic Play



- Enact night-time routines. Add pretend toothbrushes, sheets, mirror, kitchen sink becomes a bathroom sink, etc.
- Enact stories using puppets with projector and screen.
- Create a "Light Lab". Add observation tools such as periscopes, binoculars, flashlights, telescopes; set up shadow screen in front of the window.

Center Ideas– Water Table



- Use soap bubbles and wands. Find rainbows in bubbles.
- Tape mirrors to the bottom of the water table with duct tape ahead of time and then give children opportunities to view selves and objects through the water. Add foil for extra reflections.
- Put blocks of ice in the water table and drizzle rock salt on them; they'll melt differently where there is more rock salt. Give the children flashlights/magnifying glasses so they can observe.



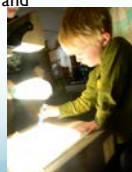
Center Ideas – Art

- Mix Paint in different ways- complementary colors, secondary colors, analogous colors, tones and shades.
 - Flashlight painting with lights out (flashlight taped to roller)
 - Mix paint in different ways using primary colors. This activity can lead into a discussion of white light color mixing.
- Experiment with choosing different paper and draw on it while it's taped to the light table.
- Make CD mobile to hang in window and observe sunlight reflecting off of CD's.



Center Ideas – Art

- Under the table drawing with Flashlights
- Overhead projector art
- Make collages using dull/shiny materials.
- Make collages using transparent, translucent, and opaque materials.
- Draw on tracing paper at the light table.
- Draw on vellum at the light table.



Center Ideas - Blocks

- Build in front of shadow screen and shine light on buildings to see the shadows.
- Attempt to build in the dark.
- Build with blocks that have different colored plastic sides.
- Build with paper cups in block area and shining flashlight through will represent translucent materials.



Center Ideas – Outdoor Classroom

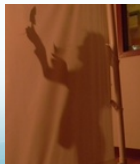
- Experiment with nature print paper.
- Look for shade.
- Use binoculars.
- Play shadow tag.
- Look for shadows.
- Trace shadows.
- Observe puddle reflections.
- Look for rainbows after a rain.



Technology Activities



- Experiment with Photo Booth - mixing and enhancing photos using light and shadows, using the Pop Art effect (Andy Warhol), etc.
- Have the children take color and black & white photos of each other. Discuss the highlights and shadows in the photos.
- Use an overhead projector to project different colors and shapes. Create designs.
- Tell stories using a shadow screen and light source.



Key Light Projects

• Black Light Lab

During our exploration of light, we used a small room used for circle time as our "Black Light Lab". A black light produces ultra-violet light (light that comes after violet on the spectrum). Black light looks violet and anything you can see glowing under a black light is a phosphor (also called a fluorescent substance). Phosphors react to the ultra-violet light and show up glowing.



Key Light Projects

• Black Light Lab

We took the children in groups of 6-10 to the Black Light Lab and introduced them to ultra-violet light. We then gave them an opportunity to create art using materials that glowed under the black light. We created collages, paintings, and made glow in the dark goop under the black light. Because we had no dark spaces, we made a black-out curtain out of trash bags to make the room sufficiently dark.



Key Light Projects

- White Light Exploration

The White Light unit was designed and created by artist Amanda Long with support from Spark. This is a computer programmed light and color experience that enables the children to interact with their colored shadows projected on a screen. Using it we could visually see how combining light colors created white light.



Key Light Projects

- White Light Exploration

We danced in front of the projectors as the light colors changed, creating beautiful shadows and shapes. We took turns performing and being the audience. We danced to light and color songs including, "Somewhere Over the Rainbow", and the "Rainbow Connection". We were also able to compare how mixing light colors and paint (pigment) colors yielded different results. When we mixed all the paint colors we got a blackish brown paint. When we mixed all the light colors we got white light.



- White Light Video
- Questions? Comments?
- Engage, Explore & Experience!

Light Play supports Developmental Goals

- Self Esteem and Independence
 - Show pride and confidence in ability (dancing in front of white light, black light art.....)
 - Experience independent interaction with White Light Unit
 - Experience joy in discovery (observing rainbows, shadows...)
- Interaction and Cooperation
 - Listen and follow directions
 - Learn to collaborate with others on projects/activities
 - Share and take turns

28

Light Play supports Developmental Goals

- Communication
 - Develop vocabulary
 - Participate in activities that encourage non-verbal expression (white light, black light)
 - Tell stories using shadow screen
- Discovery and Exploration
 - Practice using tools (i.e. telescopes, microscopes, prisms, flashlights, kaleidoscopes)
 - Identify position and patterns (i.e. the object is closer/farther from the light source)
 - Make predictions

29

Light Play supports Developmental Goals

- Physical Capabilities/Health & Safety
 - Practice eye-hand coordination
 - Participate in creative movement...white light experience
 - Discuss care of one's eyes-important to wear sunglasses
- Artistic Expression and Appreciation
 - Learn to be an audience (White Light)
 - Participate and make things for dramatic play (puppets for shadow screen)
 - Enact stories and move in creative ways to music

30
