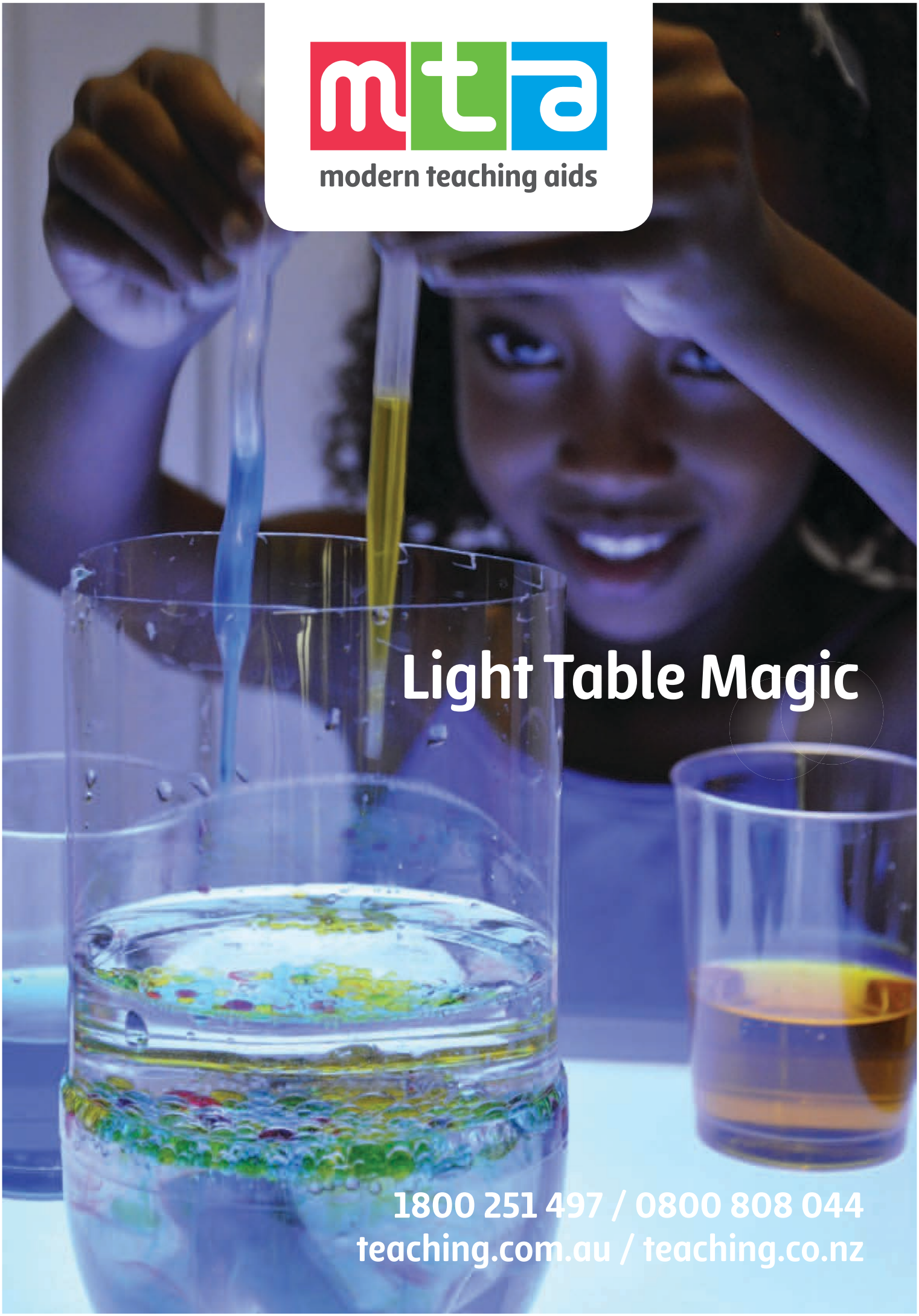
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My name is Peter and this is the story of how I got interested in Light Tables. 12 years ago I was working with a children's museum on an exhibit that focused on x-rays. Doctors had told us that children are often very nervous and scared to have their x-rays taken. I did some research and I realized that children should be nervous and scared! They are told to go into a dark room, take off their clothes (or some of them) and hold perfectly still while someone shoots radiation into their body. If there is another person in the room with them, that person is generally a stranger and is covered from head to toe in a lead apron. What's not to be afraid of in that situation?

Part of the exhibit at the museum was a big light table where children could look at a collection of x-rays.

I was in charge of getting the x-rays and designing the light table. I thought that would be easy, but it turns out that Canada has laws against handing over people's x-rays. It's all about confidentiality. I guess it makes sense, but I have to admit that it was pretty frustrating. I found a doctor in England who was willing to give me a set of x-rays from his personal collection. When I saw them, I realized that healthy people don't get x-rays done on normal parts of their bodies. What I saw was a horror show. They were x-rays of broken and mangled bones and things that should not be in a human body like nails, toy cars, knitting needles and a pair of scissors. Again, I guess that makes sense, but it wasn't what I was looking for. So, I turned to the internet. Remember this was 12 years ago. It was hard to find x-rays that were not pornographic. If you don't know what I'm talking about, just Google "pornographic x-rays" and you'll find them no problem.

X-rays off of the internet can be disturbing—choose carefully!

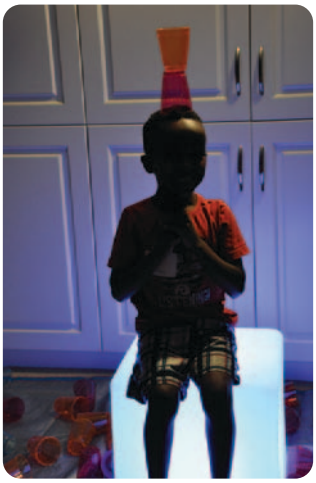
So, instead of being defeated, I did some lateral thinking. If I couldn't find human x-rays, I would find animal x-rays. We work collaboratively with a major zoo. We got some great images of birds, mammals, reptiles, marsupials, fish and amphibians. We even developed a classroom kit that used these images. My favourite shows a snake inside of a snake!

As soon as we introduced the animal x-ray pack some teachers ask for more. They told me that they had light tables in their classrooms, but they didn't have resources to use with them. I did a quick check and found that there was a real shortage of interesting materials to use with light tables. That started me on a quest to produce these materials which led me to a quest to perfect a light table itself.

I'm going to talk to you today about four things:

1. The two reasons you need a light table in your classroom.
2. Three important considerations for choosing or building a light table.
3. How to build your own light box.
4. 65 things to use or make on a light table.

Let's get started. I want to begin by introducing myself in more detail. I'm the product developer for Roylco. Roylco develops educational materials for children 3-9 years old. When I started in 1990 I focused on literacy and multicultural products. I soon found that art was my calling. I believe that any subject of the curriculum can be taught through art. But that's a whole other topic. I'm based in Canada. I have been attending NAEYC since 1993. In my work travels I've been to kindergartens, preschools and children's museums in 23 countries. We organize a summer art camp where we experiment with a wide range of crazy art experiences and test out new materials and techniques.



I'm going to start by talking about the reasons you need a light table in your classroom. Besides being an awesome classroom tool, there are two important reasons:

First, the light table is transformative. In other words, you can take a regular learning experience and repeat it on the light table and it's different. Let's take finger painting as an example. A lot of children love finger painting. If you do it too often, it becomes boring and the kids become careless. When you do it on the light table, they slow down their actions and become more deliberate. They are focusing not only on the texture of the paint, the colours they are using and the patterns they are painting, but also on the way the paint is opaque in the thick spots, transparent in the clear spots and looks like it's glowing in the thinner areas. Suddenly their process art experience turns into something that appeals to a wider part of their brain. The experience has been transformed. We can talk about that in more detail later.

Second, it has defined boundaries. Students are dealing with a restricted space. Instead of being a negative point, it actually becomes liberating. Kids need to figure out how to use the space and the materials they are given. In some cases this is intuitive, but in others, it becomes much more of a problem solving opportunity. I'm going to use building as an example. I love building on a light table. I've noticed that it encourages reluctant builders to participate. Because the space is restricted, only one or two children can participate. That helps the child who normally gets pushed out of the building experience by the bolder boys in the classroom. Likewise, it just feels more manageable to work in a smaller space than it does when you have the entire floor of the building area. That can feel overwhelming to reluctant builders. The light table gives them a smaller surface with rigid boundaries. For some kids, that works very well.

Now I want to talk about the three things that are important when making or buying a light table.

First, it has to be safe. You're dealing with an electrical appliance that uses a significant amount of power. You need to make sure it is safe under all kinds of conditions that you can anticipate in the classroom. One time I heard a teacher talking about finger painting on the light table. She said that it was sometimes difficult to clean the table because the paint would leak under the glass top. I thought….Glass top? Are you crazy? Leaking paint? Are you crazy? I really wanted to ask if it was safe, but at these conferences where I'm often the only man in the room, I get intimidated. Finally someone else asked the question and the teacher replied with a sneer, "No one's died yet." I didn't really think that was a good answer. When you buy from a reputable supplier you should have a level of comfort that they have certified test reports on all of their products. Just ask when you're placing your order if they can provide the test report. Frankly, these reports are almost incomprehensible because they are so technical, but it will give you a sense of security. I work with industrial light tables in the office and I've pressed too hard on the glass and my hand has gone through. I'm not sure what anyone is thinking when they have a glass topped unit in their classroom. Likewise, I'm not sure what they are doing with finger paint that makes it leak under the glass. It just seems obvious that a glass top and a leaking light table is not a good choice for a classroom.

Some considerations when choosing a light table:

1. The table should have a Plexiglas or acrylic top.
2. It should have rounded corners.
3. It should use fluorescent or LED rather than incandescent bulbs because they operate at a cooler temperature.
4. If it's plugged into the wall, place the table so it restricts access to the outlet and tape the cord down to the ground.
5. Don't change light bulbs during class. Wait until the children leave the room so they don't see how to access the inside of the light table.
6. Don't use a light table that leaks, but if you do, don't use liquids on a table that leaks or where the water or liquid can run across the plug or light bulb.

After safety, the next thing you want to look at is stability. Can you drop it without breaking? Can children stand, sit and lie on it? I know that sounds extreme, but unlike a water or sand table, there's something about a light table that makes it a platform and children sometimes want to stand or sit on. We want to make sure that it won't easily knock or topple over.

Safety and stability are the two most important considerations, but there are a lot of other things to look at:

a) Size: You want it big enough, but not too big. It's perfect if 1-3 children can play with it at a time. It's better to buy two smaller tables than one big one. I know it sounds extreme, but the bigger it gets the less "special" it becomes.

b) Height: Personally, I'm not crazy about table top light tables. I've been to a lot of classrooms where the tables and chairs are too tall for young children. Even if they are at the right height, if you add a table top unit, it raises the height above the level that's ideal for young children. I like floor models. Just make sure it is not too tall for your children. They should be able to stand or preferably kneel beside the light table without straining.

c) Intensity: It's great if you can change the level of light. Some children, especially kids with poor eye sight, find reading on a light table more comfortable. There is something about the light behind the page that is helpful to kids with certain kinds of sight problems. Fluorescent light bulbs cannot be adjusted, so you need to look for some

LED tables. Alternatively, you can put a sheet of semi transparent film or fabric over top. That will help diffuse the light.

d) Ideally you want to find a rechargeable power source so you don't have to have your light table plugged in when using it.
e) It would be great to have a waterproof unit.
f) It needs to last a long time.
g) Finally, it needs to be easily cleanable. I'm going to suggest some ideas that can get messy.

I developed a light table that meets my all of my needs. Let me show you:

i. It's safe. It uses LED light bulbs which don't produce heat. You can't change the light bulbs, but the table will last 7 years if you turn it on at the beginning of each day and turn it off at the end of each day. I don't think this is what you will normally be doing because I think the light table should be a special experience, not a common every day piece of classroom furniture. If you use it less often is will last for 10-20 years!
ii. It's stable. I can stand on it. Children can lay or sit on it. You can drop it and it won't break.
iii. It's 40 cm square (16")—the perfect size for young children. It's big enough for one-three children to work together, but not so big that it dominates your classroom. You can use it as a seat inside the class or you can tuck it away when not in use.


iv. It's nice and bright, but you can adjust the brightness a little bit.
v. It's rechargeable. Plug it in at night and use it all day.
vi. It's waterproof, so you can use it for painting. Even better, being waterproof makes washing and cleaning it really easy!

So our Light Cube meets all of my expectations. I don't know if you're like me, but when my expectations are met about anything the first thing I do is come up with more expectations. So….there are two unique functions with our Light Cube that you won't find anywhere else:

i. You can switch colours!
ii. You can do special tricks with the colours!

DIY Light T able

Let's talk about making your own light table. The simplest way is to either use white spray paint or self-adhesive, white shelf liner to cover the inside of a large plastic tray. Turn on and insert an LED light source; snap on the lid; and flip over. Things to think about:

1. We talked about the two important considerations for buying a light table: Safety and Stability. The tubs need to be stable.
2. They have to be strong enough so they don't buckle or crack under the weight of a child. The tubs need to be safe. They can't shatter into sharp shards when broken.

Home made light table.

3. The light source cannot over heat inside the tub. If that's a concern, drill air holes into the tub to circulate air and cool the light source.
4. Only after you have a safe and stable light table, ensure that the light is bright enough. Ideally, you want it to illuminate the materials children are working within the normal day light environment of a classroom. If the light isn't bright enough, double up on the flash light. I bought a flashlight at Home Depot. It runs on three AA batteries. To turn it on, you need to press a button. That means you need to open the tub to activate and deactivate the lights. Be careful. If you've used spray paint to make the inside white, it will scratch off, so be gentle. If one light isn't strong enough add a second light. I bought one for $15.00. They are pretty good and they are heavy duty so they will last a long time. To make it really bright, you can buy six lights!
5. You want the table to be big enough for one or two children to work with it. I've seen the really big light tables and personally, I think they are too big. They aren't “special” anymore. This is one case where small is better than big. I don't think you need to use the light table every day, so it needs to be small enough to store away easily. If you can find a paint that won't scratch off the plastic, I would suggest storing your light table material right inside the bin.
6. It should be high enough so children can sit on the floor to work with the table.

The other option is to use a string of lights. Don't use Christmas Tree lights. They are not safe. In fact, Christmas lights are the sixth major cause of home fires after Fireworks, lightning, electrical fires, unattended candles and kitchen fires. Considering they are only used one month of the year, that's pretty bad. What I worry about isn't over loading the circuit or overheating. I think there is a real potential for getting these lights wet. There are a lot of activities that use liquid on a light table. If this drips into the bin and soaks the lights, they are going to short circuit. Unlike the flash light option, you need to cut an opening into the bin and string the electrical cord though it. Once there is an opening, the possibility of water seeping in becomes significant.

Christmas tree lights are beautiful, but dangerous.

I bought an under cabinet rope light from Home Depot. It was only $19 for 12 feet. The two problems with this light string is that you need to mount it flat onto a board and that the color of the light is a bit strange. It's meant for a kitchen and they might want a warmer glow rather than a bright light. There is a fuse attached to the cord, so if it shorts out the fuse will blow rather than cause electrocution. The cords come with replacement fuses.

Now that you've made or purchased your own light table, it's time to start working with it. I've prepared ideas that relate to the curriculum. I want to start with sensory play and finish with my favourite activity: Building. In addition, I want to give you ideas for math, science, literacy and art. My goal in providing you with this information is simply to show you the versatility and potential of the light table. Once you've explored these ideas, I hope you can tailor the activities you are already doing in the class to the light table. Remember, the table invigorates traditional activities while it focuses children's attention. Have fun!

Let's start with sensory activities. Almost anything you do on the light table will have a sensory component because of the light, but I want to find ways to incorporate more senses. Like I said before, the light table gives you the change to reinvent traditional activities so let's start with some of those.

Sand Bo xes

I work with a company in Germany that makes the most beautiful sand boxes in the world. They are completely different from what we use in North America. They are very shallow and they hold a thin layer of sand. Instead of digging in the sand, the idea is to use your fingers to draw in the sand. I think this works perfectly with the light table. The sand on its own is opaque, but when you draw in it, the tracks show the light through. I've talked to teachers who find regular sand boxes a little hard to manage especially if they have a carpeted floor. They understand the importance of using sand with younger children, but they don't want the custodian to get mad at them either. Here is way to manage the amount of sand and create an exciting activity. It won't replace a sand box, but it's still a fun and useful activity!

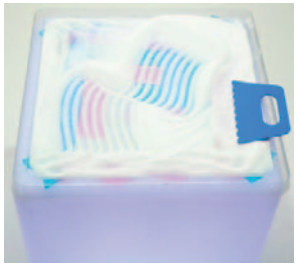
1. Start with a clear, shallow plastic tray that will fit on top of the light table. You want it to be about 4 cm (1½") tall. Some Tupperware trays work well. They're nice because they have lids for easy storage. Fill the tray with a layer of sand about no more than 0.5 cm (¼") deep of white or coloured sand. I really like coloured sand. Remember, for this activity you don't need a lot of sand (as opposed to filling up a whole sand box). You can buy it from your local school supplier or you can sometimes find it at craft stores or florist supply shops—they use it to fill vases. Once you have the sand in the tray, let children run their fingers through to feel and see how the sand is opaque, but you can run your fingers through it to make transparent lines.

2. An alternative to sand is salt. I really like working with salt because bacteria can't live it in so it's just a bit safer. Just as important, it looks great. I've used table salt, kosher salt, coarse sea salt and Epson salt. I like how all three give a different sensory experience. Give aquarium gravel a try. It comes in beautiful mixed colours and feels wonderful.
3. In the past I've used sand and salt to give another sensory dimension. I've frozen it in the summer and heated it in the winter. You need to be tricky when you're putting it into the tray so the kids don't know what to expect when they put their fingers in, but it's worth the effort. Even reluctant students who don't like the sand experience will dip their fingers in when it's unexpectedly warm...especially when other children have done it first. It's a great way to

start talking about changing seasons and developing temperature vocabulary. I put the sand in the freezer overnight to cool down. I don't mind it being really cold on a hot day. Children will self-regulate their play with cold sand—if it's too cold they won't use it, but they will go back and test it until it's the right temperature for them. It's fun to watch. For warm sand, I just heat it up in a microwave. I've noticed that some microwaves heat up specific areas more than other areas. Make sure you test the temperature throughout the sand and mix it well before putting it on the tray. It needs to have the Goldilocks factor: warm enough to notice that it's different than the ambient room temperature, but not too hot that it irritates little fingers—It has to be just right.

4. I like drawing simple pictures and putting these under the tray. As children run their fingers through the sand they see the lines of the pictures. As they get curious about these lines they start exploring what's underneath in a more deliberate way. After they have revealed the picture, I remove it and encourage them to draw their own pictures in the sand.

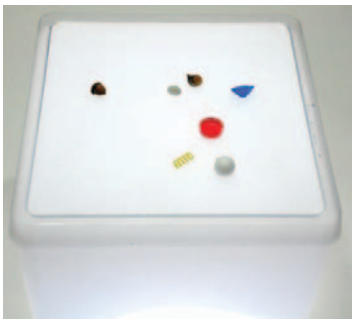
5. Draw up some simple pictures using basic shapes. Post these around the light table area or make them into cards so children can draw the picture in the sand. It's a great way to develop pre-printing hand and finger muscles.
6. Print up letter cards and put them beside the sand tray. Ask children to print the letters with their fingers in the sand.
7. Give children paint scrapers to use in the sand. It's fun to make lines and patterns and watch the light shine through.
8. Let children use simple stencils with the sand. Lay the stencil on the sand and ask a child to trace around the edge. Carefully lift off the stencil to see the image in the sand. Children can add details to the shape with their fingers, or you give them other tools to add details. Chopsticks work well. Use just one chopstick almost like a pencil and draw in the sand.
9. The last thing you can do with this mini-sand tray is to change the background. I take sheets of coloured acetate and cut shapes out of them. I then tape these shapes to the bottom of the tray. Once the tray is filled with sand, the children can't see the different colours. When they start drawing in the sand with their fingers, a paint scraper or a chopstick, they reveal the colours. It's a nice twist.



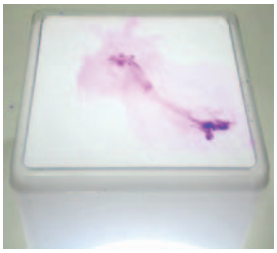
Water T ables

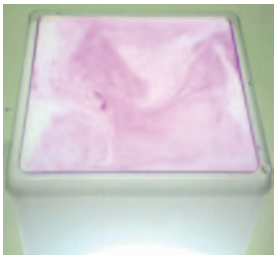
You can approach water the same way as you approach sand. There are not as many different things to do with a shallow tray of water as there are with the sand, however, I've found that it's really a very calming activity for some children. Here are some ideas:

10. Only fill up the tray with a little bit of water. It will get splashed around so have some paper towels handy. For the light table, you don't really need a lot of water in the tray. Alternatively, you can fill a clear tub with more water and do your normal water table activities on the light table. It really adds an interesting dimension when you see the shadows cast by floating and sinking objects, but personally, I like to use a shallow tray and only fill it with a little bit of water. I think it encourages children to be a little more thoughtful with the water and the materials.
11. After you've filled the tray with a shallow amount of water, place some objects that will sink or float beside it. Let kids experiment with these objects and categorize them.



12. You can tint the water with just a drop or two of liquid water colour paint. The first time I did this I was worried that it would spill. I was surprised to see how careful the children behaved as they played with the coloured water. It seems like when they can see the water, they are more conscious of how they use it. Encourage children to mix the paint with a toothpick or try blowing on it with and without a straw. The effect is magical!



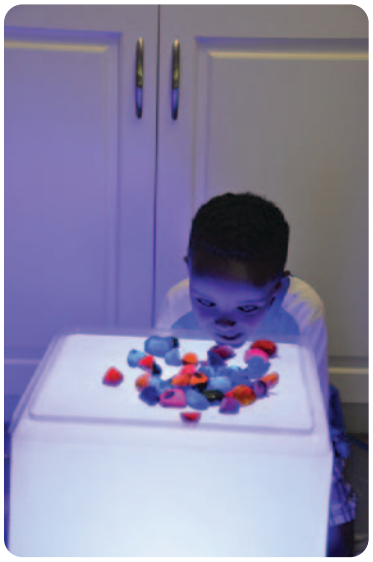


13. One of my favourite activities is to fill up an ice cube tray with water and squirt in different colours of water colour paint. I then carefully wrap the ice cube tray with plastic wrap and poke tooth picks through the plastic wrap. I freeze it, unwrap it and tape on coloured paper sails to the ice cubes. We put these in the tray and watch the colours melt and mix together. Children can blow on the sails to make the ice cube boats sail over the surface of the tray. To make this activity last longer, use really cold water in your tray. To make it go quickly use warmer water. I like to repeat this activity. I use room temperature water and 3 different ice cube boats and let the kids experience the cubes melting. The next day we repeat the activity, but I ask the kids to time how long it takes for the boats to melt. The following day I use really cold water and repeat the activity. It takes significantly longer for the boats to melt. We talk about the difference. On the fourth day I fill up the tray with warm to hot tap water. Again we time it. It's very dramatic so the kids get excited. Again we talk about why the boats melt faster. On the fifth day I give children a whole bunch of plain ice cubes, but I don't fill the tray with water. I ask the kids to build something with the ice cubes. It's tricky, but fun. In no time the cubes melt and we have a tray of water again. It's a great way continue the conversation about water, ice and temperature.

14. Some teachers I know use what's called Crystal Soil on their light table. These are small pellets that expand when placed in water. Florists use them for fancy flower arrangements in clear glass vases. They look great. I know that they are available at florist stores and at Michaels. I've even seen them in School Supply stores and catalogues. I don't like them—rather, I like them too much. I tried them and they feel great. They feel slimy, but clean, too—almost like hard bubbles or soft marbles. Then I dropped one on the floor. It bounced like a super ball. I then started throwing them around. It was a lot of fun. However, I have to think that if a 50 year old man can't self-regulate when it comes to these little balls, there's no way a little kid should be expected to. Shortly after that, I was in England and I talked to some educators there about the light table. We got talking about "crystal soil" and they told me that it had been banned in England because children ate the pellets which then expanded in their digestive system resulting in emergency medical issues.

Water-soaked gummy worms.

I've replaced these with gummy drops. They still feel nice in the tray, but they are a lot safer. They will even expand in water and get plump without getting really gooey. I love using gummy worms. They provide a really satisfying sensation while being safe.



Watching ice melt.

Squishy Sacks

Do-it-yourself sensory bags are fun to make and engaging for children to use.

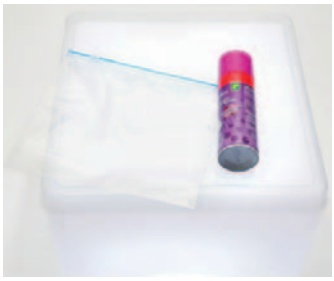
Use them to:

- Talk about science
- Draw pictures
- Manipulate small objects
- Explore cause and effect
- Build finger muscles

Zip Lock bags are great for some materials, but look for a strong bag if you have young ones who like to pound! I found heavy duty water bags at a camping supply store. They have a screw on lid so they won't leak. You can reuse them over and over.

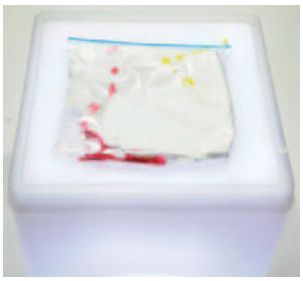
I've used zip lock freezer bags in the past, but I don't recommend them. I find that they are easy to puncture and almost always leak. Even when I tape them down and double tape the opening, they still leak if you use anything like baby oil. I really like the effect that baby oil can have in these bags, but it becomes really messy if it leaks.

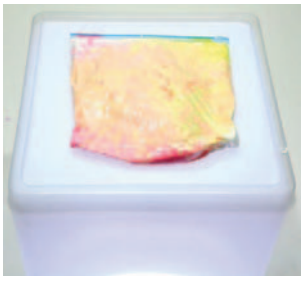
For some materials zip lock bags work really well. For instance, I use zip lock bags with "soft" materials like shaving cream. You don't have to worry if shaving cream leaks out because it's basically foam soap so it's easy to clean up. I especially like the fact that you don't need to tape closed bags of shaving cream and you can open them up later on and add more things. There are two other things that are great about shaving cream. First, it will last in a bag for at least a week which means that you can use it for a couple of days. Second, after two or three weeks it turns into an almost clear liquid. You can rejuvenate the foam by opening the bag; adding some air like a balloon; sealing the bag and then shaking it to create more bubbles. This doesn't produce shaving cream, but it's fun to do and especially good for your ADHD kids!

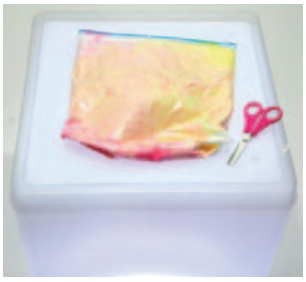


Shaving Cr eam

15. Open the bag and spray in a large quantity of shaving cream. Squeeze out as much air as possible. Don't worry if you trap air bubbles, the foam will incorporate the air as long as it's not too much. Use the bags on the light table. They have a nice glow and children can see air bubbles trapped inside. When they squish the foam, the light is revealed underneath.
16. Add some color! When you open the bag, foam will stick to both inside surfaces. You can squirt some liquid water color into the bag and close it again. Children won't know there is colour inside until they start to squish the sack. Tip: Squirt two different colours in and let the kids explore color mixing.
17. Squirt some foam into your water tray! At this point children may be a little bored with the foam sack. You can repurpose your foam by cutting off a corner and letting kids squirt it out into the water table. It floats!







18. If you still want to use your foam squishy sack, add a texture. Open the bag and pour in some small pasta shapes or rice. Close it up and let children discover the texture the next time they play with the sack.
19. Make your foam visible! Add some baby oil and blow in some air. As the children work the bags, the oil will stick to the walls of the bag. The foam can't stick to the oil so it will start to look like regular foam trapped in a bag. The effect is cool. Talk to your students and ask them to guess why the foam is reacting differently.

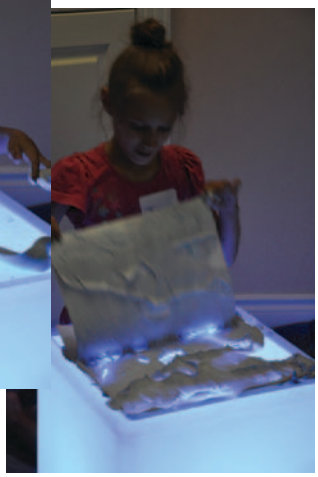
Shaving cream floats! After using it in a sensory sack, clip off a corner of the bag and squeeze it into a tray partially filled with water. Children who are reluctant finger painters may enjoy touching the "clean" shaving cream.

This young students hates getting her hands dirty. Introduce finger painting with foam.

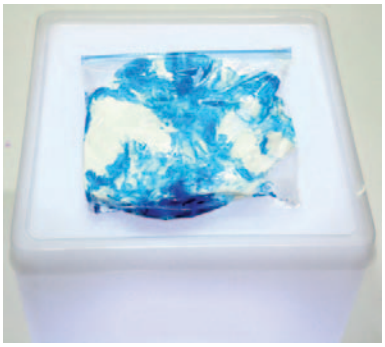
Fill a bag with shaving cream. Add liquid water color. Let children manipulate it on a light table.

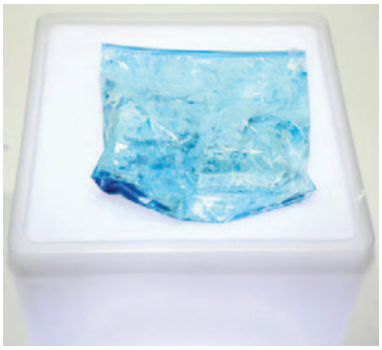
Cut a corner off of the bag and let children squeeze the foam into a paint tray.

Use the foam like finger paint. Work it around the tray.



Make a print. The paint will be very pastel, however, this is good practise for making finger paint prints.



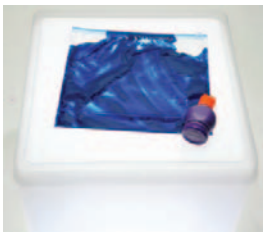
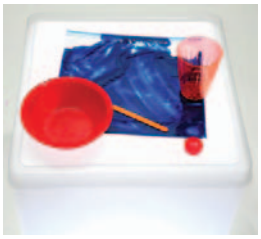
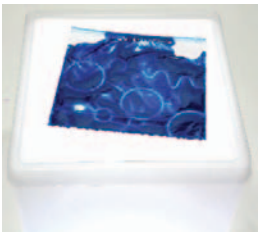
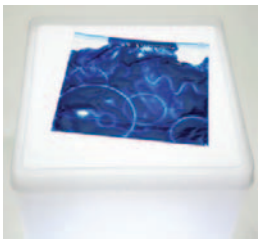
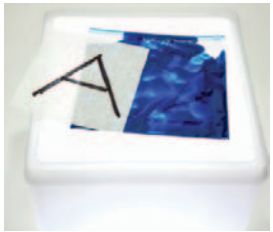
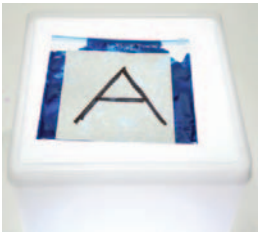


Baby oil works great with shaving cream. Fill the bag with shaving cream and add some liquid water color (optional). Pour in a small amount of baby oil and let children manipulate the bag. The oil will coat the inside of the bag and the shaving cream will no longer adhere to the plastic. If forms foamy globules inside the bag. These can be beautiful. One little boy called them "clouds".

Finger P aint Drawing Bags

Finger paint is great in a zip lock bag. Because it has a heavy consistency, it works very well to make drawing bags. Squirt about 1 heaping tablespoon into the bag. Squeeze out as much air as possible. Let children pat the surface flat to get a nice drawing surface. Use fingers to practice drawing shapes, letters and words.

20. Make Stamping Bags! Use objects to "stamp" onto the bags. Round objects like bottle caps, bowls and cups are perfect. Children can use both sides and the edge to press or scrape images and designs onto the surface of the bag. Once children are familiar with the experience, they can search through the classroom for other objects to try.
21. Print in finger paint! Write out big letters from the alphabet on thin white fabric. Tip: Differentiate the vowels from the consonants by printing the vowels in red and the consonants in blue. Let children refer to the fabric sheets while printing the letters onto the bags with their fingers OR let children place the letter fabric sheets over top of the bags and use their fingers to trace the letters. When they lift up they will see the letter on the finger paint bag.

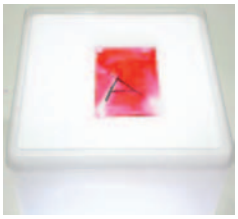

Gel P ack Bags

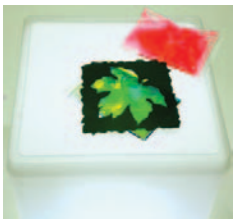
Mix colours without getting messy! The idea behind gel packs is to mix water colour paint in with a gel and then over lap the colours to make new colours. Gel is pretty easy to find. You can use something like clear glucose which has a wonderful texture and is very easy to work with, but it can get expensive and hard to find (specialty baking store). As an alternative, try hand sanitizer, hair gel, clear shampoo or liquid hand soap.

22. Mix three different gel packs. red, yellow and blue. Optional: Label the bags with Sharpie markers. Lay them out on a light table and ask children to come up with colour formulae.
23. Write words and letters or draw shapes and pictures on paper. Lay these on the light table. Place the gel packs over top and encourage children to "trace" the images and letters in the gel. Because students can see through the transparent gel, they can easily go over the lines with their fingers. The letters and words won't "stay in the gel", in other words, the gel flows back quickly after the child makes a mark, but it is good practice for printing and helps develop hand and finger muscles.
24. Make a stencil game! Ask children to arrange colours and lay a stencil over top. Direct students to make a yellow sun by lying the yellow gel pack onto the light table and placing the sun stencil over top. Make a green leaf or lizard by layering the yellow and blue gel packs on top of each other and then laying the appropriate stencil over top of that. Does it make a difference if the yellow pack is on top or bottom? Does that change the overall colour?

Note: You can make different packs with different levels of colour intensity. Just add more paint to the same amount of gel. This will give children a chance to create a wider range of colours. You only need to vary the intensity of the red and blue colours—yellow remains fairly consistent no matter the amount of paint you use.

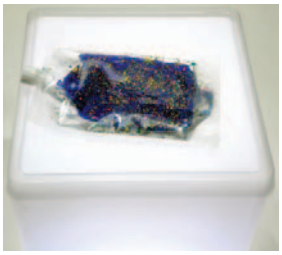




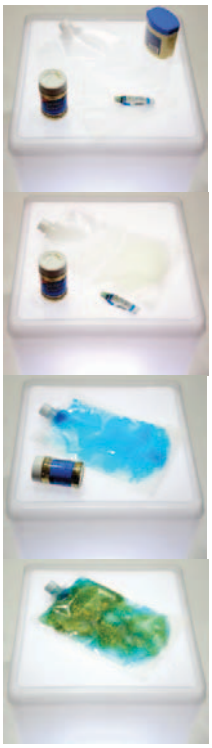


Finger paint bags and gel bags are good ideas to use with zip lock bags. If the contents leak, both are easy to clean up. However, there are times when you want something more durable. I bought water bags from a camping supply store. They are used for storing water when you go on hiking trips. I LOVE these bags! Here are some ideas for them.

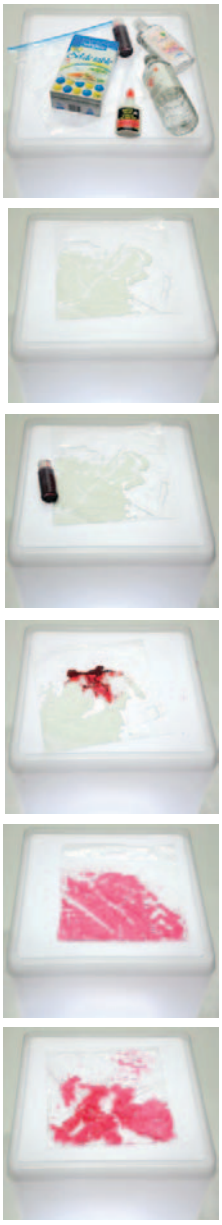
25. Glitter Sacks: Fill them with colored water, baby oil and glitter. You can't use glitter with regular zip lock bags because it is gritty and will tear through the bags and leave a mess. I've sprung leaks with baby oil and it is a mess for days. Every time you think you've got it cleaned up, you find little puddles somewhere new. The glitter in these bags really is beautiful on the light table. It engages young children for a while and some special-needs kids for a long time. To add a new dimension to the bag, simply open it up, blow in a bubble of air and reclose. Kids like to try and "squish" the air bubble. Note: The glitter will float only on top of the water—it is lovely.



26. Dense Sacks: Carefully heat Petroleum Jelly/Vaseline in the microwave until it's a liquid. Use a funnel to transfer some or all of the Vaseline into one of the bags. Let the Vaseline set up in the bag and it will return to a thick consistency. The texture of Vaseline in the bag is wonderful, but the colour is unattractive. Add a small amount of oil paint. One pea-sized drop of oil paint will colour an entire jar of Vaseline. After adding the paint, ask a student to help mix it by kneading the bag. It's really a wonderful activity to knead the bag and watch the colour transform. Once the colour is thoroughly mixed throughout the bag, use finger tips to draw pictures, print letters and write words.



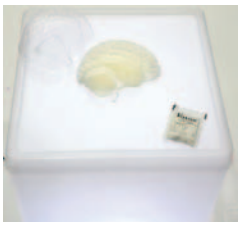
27. Unexpected Results Sacks: Here's a three part experiment. Put about ½ cup of white glue into the bag. Cheap glue works just as well as expensive glue. Screw on the cap. Ask children to predict what will happen when they squish the glue around the inside of the bag. Add about ¾ cup of baby oil. You can ask the students what will happen or you can just say something like, "Let's see what happens when we try to mix these two." Here's what I love about this process. The baby oil will coat the bag and the glue won't stick to the inside of the bag. It's an interest transformation and it works even better when a child really works the oil into the bag. Next, add a few drops of water color paint. You don't need a lot. Let the kids mix the paint into the bag with the oil and glue. What will happen? The glue will mix with the paint and the oil will remain clear. It's not intuitive. It feels like the water color paint should mix with the oil because they both have a similar consistency, but the color mixes with the glue. It's a fun process. Finally, add a couple of tablespoons of table salt. What will happen? For tactile learners who are playing with the pouches, you would think that you should end up with a mess, but instead the glue sticks to the salt and the whole thing becomes almost solid. I enjoyed this sensation myself, so I think a young children will really like it. Ask the children to come up with words to describe the texture of the salt and glue. But wait...there's more! Over night the salt will dissolve in the glue and it turns rubbery. The texture is wonderful. In the morning return to the sack and ask children to describe the contents. It feels different even though it's the same material. This can lead to a great discussion about dissolving and mixing. Note: You can dump out the contents of the bag and reuse it.

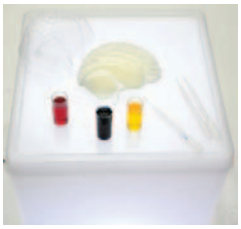


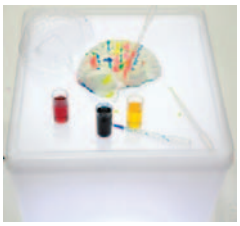
Gel Injections

As a category all on its own, I want to talk about gelatin. I use this as my “hero” activity—it’s something I do when I go into a classroom for the first time, before I know the students or the teacher. When I do it, I’m a hero!

We start by making a mold of gelatin. Start with 6 packets of Knox unflavoured gelatin. Fill a bowl with 3 cups of COLD water. Mix in all 6 packs. The result will be pretty lumpy and thick. Next, mix in 6 cups of hot water. I've used both boiling water and hot tap water. Both work, but the boiling water makes clearer gelatin. Pour this mixture into a mold. The mold can be a simple bowl or something more elaborate like our Brain Mold. If you're using an elaborate mold, apply a thin layer of vegetable or baby oil to the inside surface to make it easier to pop out. Let the gelatin set over night. Tip: If you don’t have room in the fridge, you can leave it out on a counter and it will still set up over night.







28. Help develop fine motor skills with pipettes. Fill up a few cups with watered-down liquid water colour paint in different colours. Hand out either our regular or Squiggle Pipettes and instruct children to squeeze the bulb, insert the pipette into the paint and release the bulb to suck up the paint. They then get to insert the pipette into the gelatin and squeeze the bulb again to release the paint. Depending on the thickness of the gelatin, this can have different results. Sometimes it release beautifully into the gelatin. It's looks wonderful! Other times the gelatin will be dense and the paint will squirt out. Either way, it's really fun and engaging for children. Watch as the colour of paint mix in the gelatin. Encourage children to carefully observe and describe what's going on. Remember to place a tray on the surface of the light table and put the gelatin in the tray before beginning. The light table will illuminate the paint colour in a dynamic way. Note: The children need to be careful and really focus on their fine motor skills. On a personal note, I’ve been doing this for twenty years and I love how the children engage with the materials. I have never had a case where a child grabs and throws the gelatin. They have always treated it with respect. It’s been a great learning experience for me. Given the right materials, children will respond appropriately. Thanks to Bev Bos for sharing this idea.
29. Once you have the basic idea of this activity, you're going to want to use it again throughout the year. Look for specialty cake molds and create seasonal gelatin shapes. Tip: Sometimes you can rent these at specialty baker’s supply stores. You may be able to find a heart shaped mold for Valentine’s. Use corresponding paint colours like pink, red and purple to inject into the heart. Look for fine glitter to add to your paint. If the glitter is too big to get sucked up by the pipette, simply cut off the end of the pipette to expose a bigger hole.
30. The last way to make an incredible gelatin mold is to layer objects inside the gelatin. You can get as creative as you want with this. Start off by finding objects to put in the gelatin. Here's what I do to mix up a special batch of gelatin. Start by mixing the 2 packets of powdered gelatin with 1 cup of cold water. Then mix 2 cups of boiling water into the gelatin. Mix thoroughly to dissolve gelatin. Pour this mixture into a mold and set in a refrigerator. Wait for the gelatin to set up and then add a layer of gummy worms. Repeat the process with another cup of cold water, 2 packets of gelatin powder and 2 cups of hot water. Let this mixture come to room temperature before pouring into the mold. Let set and add another layer of gummy worms. Repeat with one more layer of gelatin. Note: To create interesting layers, tilt the gelatin the first two times you set it in the fridge (but leave it flat the last time so it sits nicely in your light table tray). Once it's firmed up I pull out the mold and set it on the light table. Give the kids pipettes and let them target the gummy worms. It makes a GREAT Halloween celebration activity!

Bonus Idea

I made one batch of gelatin that was too loose. It came apart when I pulled it out of the mold. Instead of throwing it away, I used it as a way to engage a reluctant finger painter. She loved it so much that I now use it every time I want to introduce a student to finger paint.

Start by putting gelatin out on a tray. Encourage the student to break it up and spread it out over a tray.

Add a good dollop of paint. Squirt the paint over top of the globs of gelatin.

Encourage the children to feel the texture of the paint on top of the texture of the gelatin. It's a wonderful experience. Let the children run their fingers through the paint and over the gelatin.

After the gelatin has been completely coated with the paint, make a print! Start by spreading a sheet of paper over the wet paint. Pat lightly over the surface of the paper.

Slowly pull up the edges to reveal the art. It's a great process activity. You won't know what you'll get until you see the print.

Literacy

When it comes to literacy and the light table, I think there are three primary ways to use it: reading, printing, and developing vocabulary.

31. For reading, I know most children aren't active readers in kindergarten, but it is nice to have a library area where children can spend time with books. I met a group of teachers who had great uses for the light table. For struggling readers, they photocopied pages from books onto pastel paper and placed these sheets directly on a dimly lit light table. They reduced the intensity of their light table by draping them with light-weight, white cotton. They found that some children simply have a hard time focusing on the words on the page, but lighting them from behind made a huge difference. If students continued to struggle, they would give them a Highlight Strip to lay over the lines of text. These strips focus the attention on a single line of text so the children aren't overwhelmed by the rest of the text on the sheet. I'm not sure why, but the colour of the strip inside the Highlight Strip can be very effective for some dyslexic students.

32. A different way to use the light table in the library centre is as an environmental element. I've seen classrooms where they have a cubicle-like library that provides a quiet, confined and separate space for independent reading. Although these centres can be a great part of a classroom, they can be a little hard to construct and then repurpose as needed. Instead, I've know teachers who make portable library centres with a bed sheet and a few chairs. They set up the chairs in a square about 1 metre apart and throw the bed sheet over top to make a fort. Inside they put a light and books. It's cozy. Alternatively, we use our Straws and Connectors to build a fort and throw a sheet of organza over top. I like this a little better than the bed sheet because the teacher can see through it and monitor the centre, yet at the same time, it provides enough separation from other parts of the classroom that it makes the library feel private. If you have a carpeted floor, children can lay right on the ground with their book and read by the glow of the Light Cube.

33. Printing is a great activity for the light table. At the start of the year I write out a page with each child's name over and over. I like to use medium sized letters. In some work books I've used in the past, the letters are way too big for young children. It's hard for them to trace big letters. I've also found that tracing computer generate letters is less appealing to children than tracing hand written letters. Once I have the sheet of paper written out, I can either tape a second sheet over top or slip it into a Worksheet Cover and give children a dry erase marker to start tracing. The Worksheet Cover is just a plastic cover that the paper slips in. This is great for first practicing tracing and it's really easy for kids to use. It's especially nice because it's crystal clear so it's easy for kids to see the printed sheet, however, I've noticed that they take more time and achieve better results when they are tracing the letters onto paper. I think it's because tracing onto paper feels more important or more permanent, so they take more time to get it right. I like to start off with the dry erase markers and the Worksheet Cover, but after a few practice sessions, I switch to paper and let the students know that they can take their work home to show their parents. I think taking it home motivates them to spend more time and put more effort into the process. Learning their name is quick and easy. I then graduate onto other printing exercises, but I try to keep it personal, so I work on a custom list of words for each child. We might include family words like Mom, Dad, sibling and pet names. I also like to have more generic word lists that kids can use when they are motivated to learn more words. I try to keep these lists seasonal or topical.

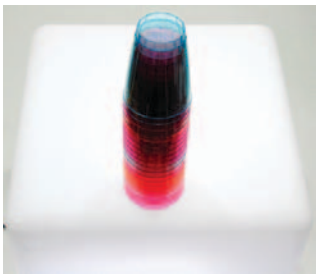

34. The last literacy opportunity focuses on vocabulary. With the light table it's easy to learn light related vocabulary. I started out by talking to children about a very basic concept: transparent and opaque objects. When I simply tried to describe these things and look for examples in the room, I found that they either lost interest or really didn't seem to grasp the concepts. When I worked with a different group of children and repeated the same concept by using materials on the light table, not only did they stay engaged longer, but they also grasped the concept quickly. All I did was to describe transparent as see-through and opaque as not see-through. I showed an example of transparent with the buttons and an example of the opaque as a coin. Then I put other objects on the table and asked the students to describe them using transparent and opaque. They understood the concept so well that it wasn't a challenge at all. I added the word reflective to the list. That made it much more challenging because they could often use two words to describe the object. A mirror was both opaque and reflective. One child saw his face in a Worksheet Cover so he said it was transparent and reflective. They started going through all of the materials in the classroom and putting them on the table to describe them. I don't think this type of learning would have taken place with such eagerness without the table. My favourite was when they used finger paint. When they put it on as a big blob, it was opaque, but when they spread it out very thinly, they said it was transparent. I'm not sure that is technically correct, but I really loved how they explored the concept. Likewise, they took liquid water colour and found that it was transparent. They tried to pour a big blob of it to make it opaque, but it always stayed transparent although they noticed that the colour got darker. It was fun to paint a sheet of paper with the paint. They couldn't decide if the paper was transparent or opaque because they could see through it, but it wasn't clear. That's when I mixed things up by adding the term, semi-transparent. One little boy said, “Semi-transparent…that's what my dad drives!” I think he meant a semi-transport truck. We talked about what the prefix semi meant and that started a whole new discussion. For a whole day they added the prefix semi to everything. Their snack was semi-lunch. 1 was semi 2. Pink was semi-red. Some of the words they came up with were really clever. It was fun!

Math

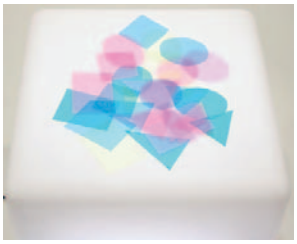
When I started this workshop I said that there are two main reasons to use a light table. First, because of its boundaries, it focuses attention. Second, it adds new life to tired activities. When it came to math, I wanted to see if we could use some of the aspects of light itself to help students get basic concepts. Because I'm using the light table with younger students, I really wanted to keep the math concepts basic: Counting, sorting, sequencing, patterning and simple addition and subtraction. Here's what I did:

35. Sorting: I found that it was easy to engage children in sorting by colour on the light table. I used really big buttons in clear colours. It was easy to encourage children to start making piles of different colours. Once they made their piles, we counted each one together. I asked children which pile had the most buttons and we stacked the buttons. I pointed out that the higher the stack of buttons, the more buttons there were and the more intense the colour was.

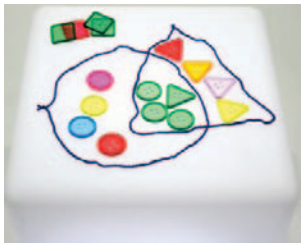
36. It was great to have a wider arrangement of materials that worked as well as the buttons. I found that small plastic glasses worked really well. They are hard to find in different colours, so instead of stacking by colour, I wrote down a number on a transparency sheet and asked the students to stack that number of glasses over top of the number. It was really interesting to watch the kids work at this. Some children would stack the glasses one inside the other either facing up or facing down. But then one child stacked the glasses to make a tower. Once a child made a tower, everyone who followed made a tower. It was really wonderful to see because it was often times a reluctant math learner who made the tower. It gave me an opportunity to praise his ingenuity and encourage his love of math. Once they started making towers, I found that children began to be very thoughtful about counting their cups.



37. The buttons were great for sorting by shape. If you can't find coloured buttons, you can make your own shapes by cutting them out of coloured acetate. I bought coloured project covers from Staples. Print off a sheet of the shapes you want to use, tape 2-4 sheets of acetate on top of the print off and cut all of them out at the same time. Students can over lap the shapes to make new colours. I've used Roylco's Stained Glass paper to cut out shapes and that works well, but you have to laminate them. It's nice to have different amounts of each shape in different colours so you can count each pile after the children have sorted them. Later, you can use these shapes with Venn diagrams, too.

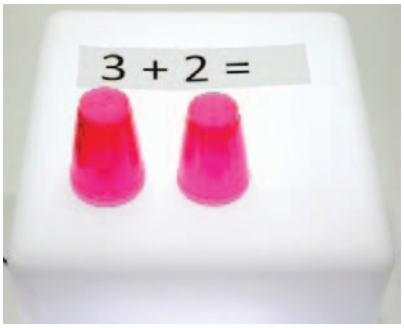


38. To make a Venn Diagram for my light table, I used yarn. I took a 75 cm (30") length of yarn and tied the two ends together. I repeat this with a second length of yarn. To make it a little more interesting, I formed a circle with one yarn loop and a triangle out of the other and overlapped them. I place a circle in the circle loop and a triangle in the triangle loop and one of each in the same colour in the interesction. I then gave all the shapes to the students and let them sort them by shape and colour. It was a challenge at first, and some children

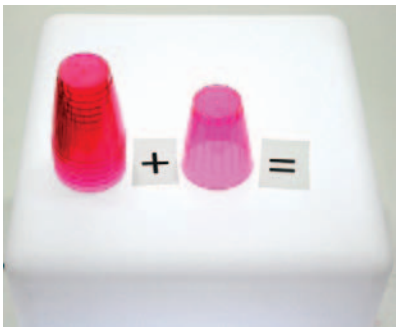


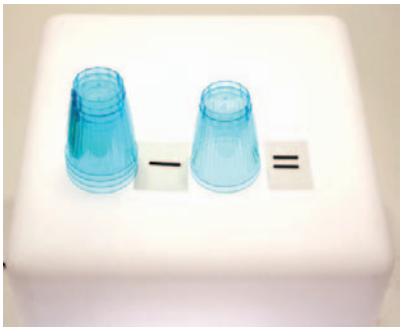
never really got the concept. I'll admit that some students got a bit frustrated. It was the first time that they worked on the light table as a task rather than had fun with it. I have to find a better way to engage them in Venn Diagrams!

39. I like how sometimes learning happens without directing it. I found that this was the case when we started working on addition and subtraction. As we worked with the stacking buttons, I noticed something really wonderful. Children were fascinated with how the colours intensified as the stack got higher. It was an unexpected result and I wanted to explore it more. I started with one child. Together, we took three buttons in the same colour and made a stack. It was easier to stack the buttons when they were different shapes. This worked really well because the centre colour became more intense while the edges remained distinct. I pointed this out to the student. I asked what would happen to the centre colour when we added another button. She answered correctly that it would get darker. We tried it and she was right. The result was that we learned that adding more buttons made the colour darker. I then wrote down simple equations on a sheet of white paper. For instance, 3 + 2 =. I placed the sheet on the light table and asked a student to pile a stack of 3 buttons and a stack of two buttons. I then asked, what happens when we put these two stacks together? We then made a third stack of 5 buttons. Just looking at the colours let the child know which pile had more buttons. I think this idea made the concept of "quantity" more real. This sounds simple, but the kids were really engaged in this activity in a way that I don't think they would be without the light table. They really focused their attention on the layered colours. I think it made the concept more real to them when they could see that the stack wasn't just a bunch of buttons or cups, but a whole new thing.





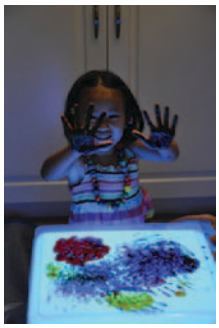


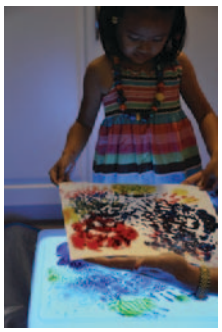



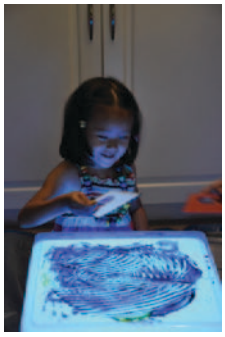

40. Once we mastered addition, subtraction was a breeze. It was also a lot of fun in a way I didn't expect. I started again by writing an equation on a sheet of paper. I asked the children to make a stack of cups that represented the first number. I then said, "Let's subtract the second number by removing that many cups from the stack." After we did that, I asked, "How many cups are left?" Some children jumped right to the correct answer while others started off by counting the remaining cups. What was fun, though, was making the answer stack of cups. Instead of simply re-piling the cups on the other side of the equals sign, I asked them to use tongs to restack the pile. It was a lot of fun and I was really impressed with how well children did.
41. For both adding and subtracting, I wanted to try higher numbers. The buttons wouldn't work because I didn't have enough of each colour, so I used coloured cups. The kids already got the concept of intensifying the colour by stacking so they didn't need to reinforce that. It works with the coloured cups, but not as well because you need to look down on the cups and the stacks can get a bit too high to make that easy to do. That being said, it was fun for the students to make stacks that represented numbers up to 20 and adding and subtracting them. I made traceable certificates that students could place on the light table that said, I can add up to 10 or I can add up to 20 and I gave them paper and crayons to write out the words. It was a fun thing to send home to parents.

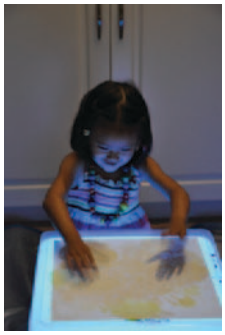
Art Projects

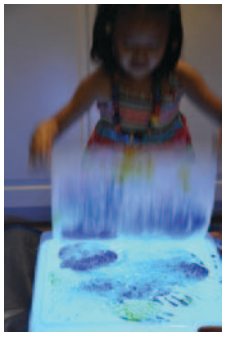
42. Fabulous Finger Paint! I love finger painting! I know it's messy and I've met teachers who refuse to do it, but when I see how much joy kids get out of finger paint, I know that it's great to do. Even more importantly, it strengthens their fingers and starts to prepare them for early printing. The trick is to make it worthwhile. In the past I've worked on embossed paper to use while finger painting (Deluxe Finger Paint Paper). I've even worked on additives you put in the paint to give them wild textures (Finger Paint Sensations). Those are fun ideas. The light table transforms regular finger painting activities into something very special. Although you can finger paint on paper on the light table, it is more fun to finger paint directly on the table. Because finger paint is so thick, it's interesting to see the contrast between the opaque paint and the transparent lines where the fingers run through the paint. My experience is that children focus on their fingers and really slow down while painting. They become much more deliberate with their actions. I've studied this. I've taken the same child and had him or her finger paint on a regular table. The next day I ask them to finger paint on a light table. The difference is remarkable. Because they are more deliberate, they produce more interesting or thoughtful effects. These effects really strengthen their finger muscles. It's wonderful to see. To make things easier, I suggest using a clear tray on top of your light table. We sell trays that fit snuggly on our Cube. Alternatively, you can just cover the work area with cling wrap. Let children paint away and then lay a sheet of paper over top to make a print. Try making several prints of the same artwork. Explore the differences between the prints. Cling wrap and plastic trays produce different results. It's fun to experiment with these. Tip: I love the idea of using these sheets of paper in collage crafts. Encourage children to use just one or two colours of paint. Let them make two or three prints. If they want, they can take the one they like the most home. Use the other two sheets for collage art. Let kids cut shapes out, arrange the shapes onto a paper background and then glue them down.











43. I know one teacher who uses our paint scrapers to make collage paper. The kids run their fingers through the paint and take a few prints. Next they run the scrapers through the paint and get a totally different look. They make a few prints of that, too. It's a great way to do process art that you can then use to make collage or representational art.

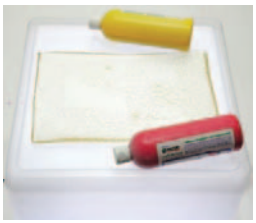
From the "Art With Ms. K" blog.

44. I wanted to find a different take on finger paint. I saw a YouTube video on Gelli Plates. These are thick clear rubber or silicone plates that you spread acrylic or oil paint on and then use different materials to get different effects. They are really cool. Unfortunately, they are also really expensive. I wanted to make my own. Here's the recipe:

What You Will Need:

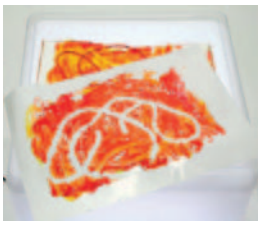
12 packets of Knox Gelatin (8 Tbs.)
3 cups of warm water
2 cups of 70% Alcohol
1 cup of Glycerin
Pan or mold
Wooden spoon or whisk for stirring

Note: for coloured jelly pads add a few drops of water colour paint or food colouring.



- Combine all the ingredients and stir until the gelatin has dissolved.

- Once the gelatin has dissolved pour into a pan or mold.

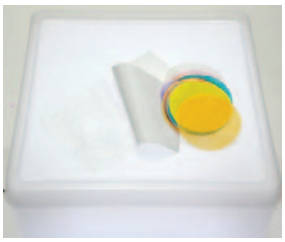


Once they set up, they will last for months without discolouring. Use them as a base for print making. Children can finger paint or use a brush to apply paint to your jelly pad. Lay a sheet of paper over top and pull off a plate. Tip: thick paint works better than thin paint. You can also paint the surface of your jelly pad and then place things over top like a stencil or string or bingo counters—anything that has a nice shape and is thin. Now make a print and see the results. The effects can be wonderful. There are tons of different ways to use jelly pads and I'm interested in hearing about your experiments. I'm going to be working on this more over the next few years.

45. Tracing seems like a natural thing to do on a light table, but it's taken me years to really embrace it. I don't like the idea of tracing because it's not very creative. On the other hand, it's easier to trace a picture than to draw one free hand. Likewise, it builds up the gripping muscles in the hand. I know it shouldn't be important, but I've also noticed that kids can make amazing pictures by tracing. I've seen parents react to these pictures and their expressions are priceless. They never thought their child could achieve such great results. The trick is to make this a little more creative and process oriented. I love using our Animal X-rays as a tracing tool. I hand out one of the x-rays and ask the children to imagine what the animal looks like. Then I put the x-ray on the table and let the children draw the picture of the animal using the skeleton as a reference. They are able to get the head, eyes, mouth, nose, neck, legs, tail, etc., in the correct place and they draw them in the correct proportion. Once they have the right shape, it's easy to fill in details about the body. The results can be really spectacular. The process is interesting and engaging. They do all of this while developing the muscles in their hands.

46. Make your own x-rays! Using x-rays on the light table is fun. Here's a way for children to make their own! Start with a Paint Bellow and suck up a small amount of white tempera paint (you can also use a spray bottle filled with watered-down white paint). Trace and cut out a template of a child's hand and arm. Place the template on black construction paper and spritz with white paint. Next, examine the x-ray of the hand. Use Q-tips to represent the bones. Cut them if necessary and glue them onto the paper. It's a great way to talk about the bones and the x-ray process!

47. Make tissue paper and contact paper stained glass! This is a great craft to repeat throughout the year and see how much progress children are making in developing their fine motor skills. Start at the beginning of the year. Cut clear contact paper into 20-23 cm (9") squares. Flatten them by pressing between heavy books overnight. Arrange piles of coloured tissue paper circles or other shapes.

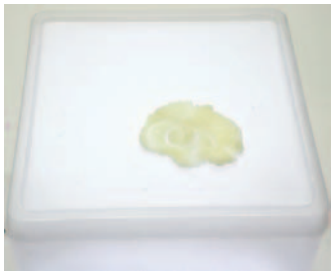


Peel off the backing paper and lay the contact paper squares onto the light table with the adhesive side up. Encourage students to arrange the tissue paper shapes over the adhesive. They can cut off the tissue paper that extends off the edge of the contact paper. Over the course of the school year, I've seen children go from simply applying the tissue paper in a fairly random way to organizing the shapes in beautiful patterns. Creating three versions of this art project, at the beginning, middle and end of the school year, really shows parents and the teacher how much progress children have made in developing the motor skills and the ability to focus on a task and consider things like colour, shape and pattern.

48. Another form of tissue stained glass is really simple and very satisfying. Start with a clear plastic tray or one of Roylco's plastic rubbing plates. Mix up a solution of 1 part white glue to 2 parts water. Use a sponge to liberally apply the glue mixture to the surface of the tray or rubbing plate. Encourage children to arrange, overlap and layer tissue paper shapes over the glue mixture. Add a light final coat of glue over the tissue paper. Let it dry completely (at least overnight) and then help the kids peel off their tissue paper stained glass. Peeling it off is the most fun part of the project. You can apply this to your classroom window by just lightly dampening the shiny side and sticking it on the window.

49. Contact Paper Collage! Here's another way to use contact paper. Cut off a piece and remove the back with the adhesive side up. Set out different transparent, translucent and opaque materials out in bowls. Let children arrange these materials on the adhesive side of the contact paper. When they have everything they want positioned where they want it, lay a second sheet of contact paper over top and press to "sandwich" the materials between the two layers. Hang in a window for maximum effect!

50. Clay can work on the light table. I've made my own recipe for a semi-translucent clay. Although it isn't self-hardening, so it won't be permanent, it looks and feels great. Here is the recipe:



What You Will Need:
½ cup Salt
½ cup Boiling Water
¼ cup Cold Water
½ cup Cornstarch
Wooden spoon for stirring
(Makes about 1 cup of clay)

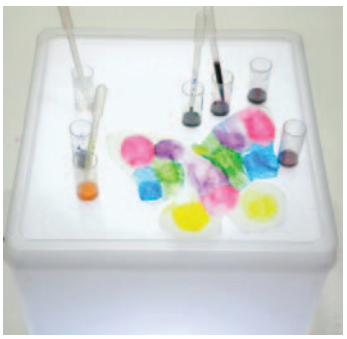
- Pour ½ cup water into a pot and bring to a boil.
- Pour salt into boiling water and stir until completely dissolved. Remove from heat.
- In a mixing bowl, slowly add the cornstarch to the cold water. Stir well.
- Add the cornstarch mixture to the salt solution. Stir constantly until combined.

- Continue to stir the mixture until it has the consistency of stiff cookie dough.
- Once the clay has cooled, knead it until it is soft (Note: Clay will be sticky while it is warm, but becomes more like clay as it cools).

Store your clay in an airtight container. The clay will harden within 24 hours and become less transparent as it hardens.

51. Use the light table as a dramatic back drop for beautiful nature and scientific photographs. I have a collection of rocks and minerals, fossils, shells and mounted insects and spiders. I bring these out and let the students take pictures of the specimens on the light table. Once they are familiar with photography, they can achieve some pretty amazing and dramatic shots. After we finish up with my collection, I encourage the children to go out and look for unique things to photograph from nature. We even take the Light Cube outside and photograph leaves and stones in the playground under a shady tree!

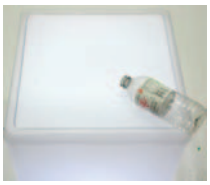
52. Teach students how to mix paint colours! It's been my experience that many adults seem to think that mixing paint comes naturally to children, but I think it's a teachable skill. Start by adding different amount of paint to clear vials or jars. Write down a formula for each mixture. The students can either watch you do the mixing or participate by adding the paint, mixing the colours, calling out the amounts of paint to add or writing down the formulae. Come up with as many different colours as you like. I like to have a bright and dark colour in green, blue, red, orange and purple. Personally, I only ever use one shade of yellow. Once you have the formulae, explain that the same thing works with different paint. For instance, finger paint or tempera formulae are very similar to water colours. Mix up a sample to show them. Once you have the liquid water colours you like, unmix them through a process called Chromatography.
53. Chromatography is the art and science of separating colours back into their components pigments. Simply speaking, each colour pigment has a different density. To separate out the different colours, you need to use salt water to diffuse and deposit each pigment according to their own densities. To make the salt water solution, mix 1 tablespoon of salt with ½ cup of water. Not all of the salt will dissolve in the water. Mix it until most salt is dissolved. Tip: Use hot tap water. Epson salt works really well for this, but table and kosher salts work, too. Next use a pipette to drip small drops of paint onto Roylco's Color Diffusing paper or use coffee filters. Coffee filters work well, but because our color diffusing paper is designed for use with water color paint, it works a little faster and is less expensive. It's fun to cut shapes out of the paper. I like butterflies or fish, but regular squares and circles work well, too. After you've dropped several different colours on the paper, drop two or three drops of salt water solution over top. The drops will spread out. Each different colour pigment will form its own circle. You can read these circles to see which pigments were used to create the colour. For instance, when you drop the salt water over a green paint dot, you end up with a yellow centre circle, followed by a lime green halo, and ending with a blue disc. Yellow pigment has a heavier density than blue.

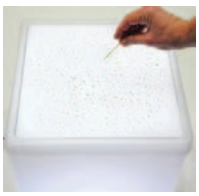



Science

Chromatography leads us into a conversation about science. Although technically, chromatography is a science experiment, I think it's at a level that's going to be beyond most Kindergarten students. That being said, it's an interesting approach to a science experiment. There are other things we can do to demonstrate interesting science concepts:

54. Get out the water tray to demonstrate interesting aspects of soap! This experiment feels almost like magic. It's dramatic and fun. Start by filling the water tray with just enjoy water to entirely cover the bottom. Get out a pepper grinder. If you can adjust the grind on your pepper grinder, set it to fine. You or a student can twist the pepper grinder to produce a light dusting of pepper on the surface of the water. Tip: I like the way the pepper grinder works and feels as I'm using it, but for a more straight forward approach, you can sprinkle cinnamon directly on the surface of the water. Next take a toothpick and dip it into the water. Nothing will happen. Now take the same toothpick and dip it into some liquid soap, either hand or dish washing soap. You can ask the students what they think will happen when you insert the soap end of the tooth pick into the water. When you dip the toothpick into the water a layer of soap molecules forms very quickly in a circular shape. The soap pushes the pepper flakes or cinnamon powder out in a circle. The reaction is very fast and dramatic. All the kids will want to try, so get ready to repeat this trick over and over. You can try this with powdered paint, too. Remember, you can repeat the experiment a couple of times on the same tray. Start in the middle, but stick the toothpick into the corners, too.

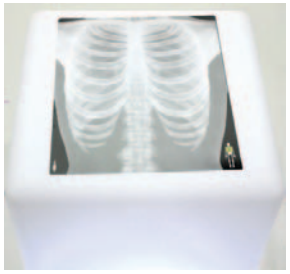




X-rays are a great way to introduce the inner workings of animals and people to young children. I love our animal x-rays because you can compare and contrast anatomy. For me it's been wonderful to see how children respond to the animal x-rays. Once they get over the initial excitement and wonder of seeing all of the different animals I ask them to name each one. Some are easy like the birds, fish and snakes. Others are a bit more challenging because they are just not that common. The joey or baby kangaroo isn't that common for us in North America, but once children know what it is, they love it. The kit includes matching picture cards. Kids can lay the x-rays over the picture cards to see how the bones work inside of the body. Once children are familiar with the animals they can do two different things.

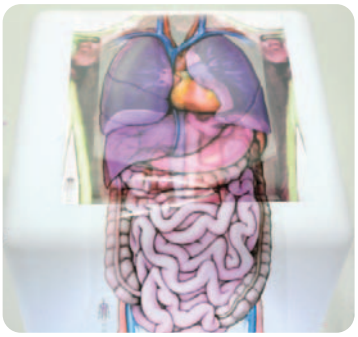
55. First, they can categories the animals in fish, birds, mammals, amphibians and reptiles.
56. Second, they can compare and contrast the anatomies. All of the animals have skulls, ribs and spines. What else do they have in common? Look at shoulder blades, hips, legs, arms, fingers and toes. How are they different?

57. Once you've completed your study of animals, it's time to look at people. You can start with Roylco's Human X-rays. This is a pack of x-rays that make up the entire human body. There is a small diagram on each piece that show exactly where the piece goes in the human body. We've split up the pack so you can compare the hand to the ankle, the elbow to the knee and the arm bones to the leg bones. If you don't have access to Roylco's x-ray pack, you can print off your own x-rays from the internet. Search for x-ray images and look for the largest file size. Next print it off so it fits to the page, but use a sheet of overhead projector film in our laser printer or ink jet printer. Tip: Make sure you buy the transparency film that works for your type of printer. Transparency film is expensive, but it can come in very handy on the light table. Once you



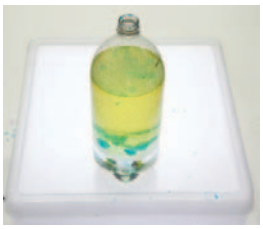
print the x-ray it's a good idea to laminate it. We use a special film on our x-rays to prevent the ink from scratching off. With the x-rays, encourage children to hold them up against their body to gain a better understand of how the bones are arranged in the body. With our set you can lay them out on the floor or a big table and construct the entire human body.

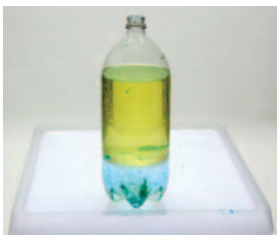
58. To gain an understanding of the bones and the organs in the human body we have just developed a set of MRI scans that work the same way as our Human X-rays. The scan comes in sections and can be used to make up the entire body. It's the same size as the Human X-rays so they can be over lapped. Additionally, we have two overlays which show the organs in more detail. It's amazing how well the kids start to learn about the major organs like the stomach, lungs, brain and heart.



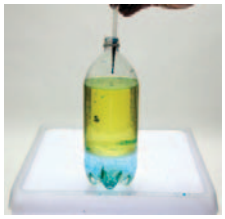
59. Static electricity: Start with a medium clear water bottle. Remove the label, clean and dry thoroughly. Cut out some small shapes from tissue paper. Drop the shapes into the bottle. Talk to the students about the bottle. What do they observe? Flip the bottle over and watch the tissue paper pieces flutter to the top of the bottle. This is a great way to introduce gravity into the conversation. Next comes the fun part. Talk about electricity. It powers our appliances and we can see it in the form of lightning during a storm, but there is also static electricity which is generated in nature. It's caused when two surfaces rub up against each other. One surface conducts electricity well. The other does not. The surface that conducts electricity transfers some of its charge to the surface that does not and the electric charge stays there until it is released. We can feel, hear and sometimes even see when the electric charge is discharged in the form of an electric shock and flick of light. Rub the bottle against the classroom carpet or even your hair. The tissue pieces will be attracted to the charge and will flatten out along the side of the bottle. To release the charge, rub the side of the bottle with a clothes dryer sheet. If that doesn't work, cut out a long spiral from the dryer sheet and insert it into the bottle leaving one end outside of the bottle so you can pull it out. Let the students repeat this activity. The light table isn't essential for the experiment, but the bottle looks wonderful on the table—almost like stained glass.

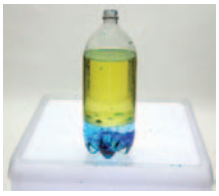
60. Make a giant lava lamp. Start with a large soda bottle. Fill it about 2/3 full of cooking oil. Fill another ¼ full with plain tap water. There will be space left at the top. Put on the cap and let kids see how the water and oil don't mix. Oil is less dense that water so it floats on top. Prepare some ice cubes. Make sure these cubes are small enough to fit into the spout of the bottle. Freeze the liquid water colour inside the ice tray. Drop the paint cubes into the soda bottle. If everything goes according to plan, the ice cube will float on the surface of the water. It's really neat to see. As they melt, the colour will flow into the water, but not the oil. It's beautiful. To prolong this process, prepare the oil and water bottle first, by placing it in the refrigerator or freezer until it's really cold. The ice cube will melt slower. If you want to extend the activity more, you can add different colours. This time, just use a pipette to transfer paint directly into the spout of the bottle. It's really beautiful. The drops rain down through the oil and settle

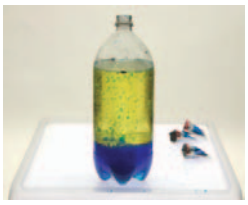




on the surface of the water for a few moments before popping and mixing with the coloured water. I like starting with yellow and adding red paint to make orange. I always like to start with yellow and add either red or blue. I've found it to be more dramatic. To make the lava lamp, drop in antacid tablets. The tablets contain both powdered baking soda and citric acid. When the acid is reconstituted in water it releases the gas trapped in the baking soda to produce bubbles. The bubbles travel up through the oil and are released on top. To make the reaction work better, crush the tablets to expose more surface area. You can save the oil by carefully pouring it out of the bottle and use it to repeat the activity later on.







Building

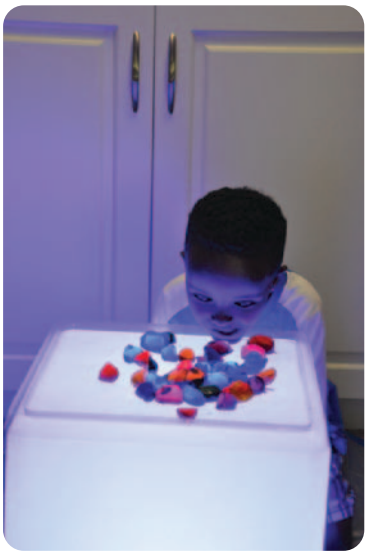
The final area I want to talk about is Building. I love building on the light table. I've found that the confined space is great for reluctant builders who might be intimidated by the larger space in the building centre or get bullied out the building centre by some of the more aggressive students. Building on the light table is more of a solitary or small group project. I've noticed children really focus their attention on their towers. It can be a slower, more deliberate process and sometimes the children are reluctant to knock down their towers. If you experience the same thing, that means you can choose building materials that have unique properties, but aren't as robust as wooden blocks.

61. Clear blocks: There are several commercially available building blocks that are colourful and clear. You can buy these through Wintergreen in Canada and Lakeshore in the United States. They have: Light and Color Tabletop Blocks in 5 shapes and 4 colours; Size and Color Cubes in 3 sizes and 6 colours, Magna-Tiles; and, Crystal Climbers. All of these are fun and good to use on the light table. They can be expensive. They are a good investment, but I have an alternative you can use before you commit to buying the expensive blocks.
62. Plastic Cups: I work with students to instill in them a respect for materials, tools and each other. I bought cheap coloured plastic cups to use as a building block on the light table. My experience is that children build towers in order to knock them down. I talked to the students about how fragile the cups were and even demonstrate by breaking one. I warned the kids to be careful, but I wasn't expecting the results I got! Because I used our Light Cube only one or two students could work on building coloured plastic cup towers. I gave everyone a turn building with the cups and they made some really high towers, but remarkably, no one knocked them down unless I gave them a lot of encouragement. It was really wonderful how careful the children were.

63. I bought a whole bunch of photo cubes from the dollar store. I love how big and how perfectly square they are. I wanted to colour them so I took some white glue and added just a little squirt of liquid water colour. I then “painted” the inside of each cube with the glue. The colours turned out beautifully. The glue spread evenly over the entire surface of the cube. Unexpectedly, some of the glue seeped out the edges. I didn't really worry about it that much because it was easy to clean up. When I assembled the cubes after the glue dried, I noticed that some the edges where the glue ran out were still a little rubbery. What I didn't expect was that children loved these rubbery edges. They learned very quickly that they could build

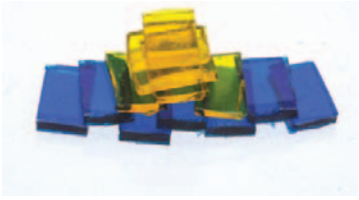
really incredible things if they used the sticky edges to hold the blocks in place. They set the blocks on angles and really enjoyed making unusual towers. It was great.

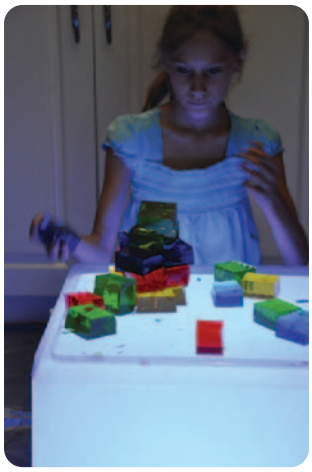
64. Ice Cubes: In the summer, I take our Light Cube out in the play ground. I know it's a strange thing to do, but under a tree or in a tent, it works really well, especially as a platform for taking pictures of different outdoor specimens like leaves and the occasional insect. I was looking for some things to do with it when I thought of using ice cubes to build. It was a particularly hot day and I had a big bag of store-bought idea cubes that we had been using to cool our water. The kids started to stack up the ice cubes. It was fun to watch them try to build before the ice melted and everything slipped back into a pile. This was a learning moment for the kids. They experienced the ice and had fun. I'm not sure it can be integrated into a standard school activity, but it's a great reminder that learning opportunities happen where ever you find them.



Watching ice melt.

65. Jelly Blocks: I used the same recipe as I did for our finger paint jelly pads, but this time I tinted the water with different primary water colour paints. I let the pads set up and then cut them into blocks. It's a lot of fun to build with these blocks because they jiggle and when two different colours are stacked, they form a third colour. I love this. It makes the Speedy Builders slow down and it rewards the deliberate worker with excellent success. Plus, it's just fun.





Note: When you cut out your blocks, there will be scrap left over. Use this material on your light table. It works wonderfully well to make shapes and squiggles. It's a lot of fun!You can do the same sort of thing with just gelatin blocks, but these are a lot better and last a lot longer!