MYSTERY BOX FACILITATOR GUIDE

The Philosophy Behind the Mystery Box Challenge
The Children's Creativity Museum (CCM)'s mission is to help visitors build creative confidence. To accomplish this mission, CCM builds its programs and exhibits upon its "creative pillars." The Mystery Box Challenge (MBC) beautifully combines several of these pillars: twenty percent inspiration, constraints, and process over product, just to name a few.

Twenty Percent Inspiration
If you hand an artist a blank sheet of paper, don't be surprised if you get a panic attack in return. It is difficult for anyone to create in a vacuum, so imagination starters are a key tool for promoting creativity. In the MBC, the building prompts and the surprise building materials provide the twenty percent inspiration to kick start participants' imaginations.

Constraints
How constraints factor into the MBC is obvious: you can only use the stuff in the box. But how do constraints make us more creative? For one thing, they liberate us from perfection. If you have a limited number of materials to work with, you know from the get-go that your earthquake-stopping robot is not going to exactly match the image you have of it in your head. Instead, the few materials you have become charged with possibility. What could a pipe cleaner be? An antenna? A lasso? A laser beam? And what could it be if you attached a popsicle stick to it? In short, constraints force us to forget about what we don't have and to think critically about what we do have. Sound familiar?

Process Over Product
Because constraints reduce the need for perfection, the physical objects that participants create is not the most important part of the MBC. What is important instead is the process of creating these objects. What was the inspiration for the creation? What connections did participants make when brainstorming? What challenges did they face? What would happen if a giant eagle attacked the parachute they built? The purpose of the MBC is to think, and the thoughts behind a MBC creation are far more precious than the creation itself.
If you choose to facilitate the MBC as a group activity, participants also have the opportunity to practice valuable teamwork skills such as brainstorming, compromising, and giving and receiving constructive criticism. A MBC group brainstorm is also a great way to help participants appreciate the creativity of others and to learn about the power of synergy. All of these experiences enrich the process of solving a Mystery Box Challenge.

How to Fill a Mystery Box
One of the beautiful things about Mystery Boxes is that you can put just about anything in them. The MBC is therefore quite doable on a limited budget and is a great way to recycle and/or reduce trash anxiety. The box itself doesn't even have to be a box; it could be a bag or any kind of container opaque enough to hide its contents.

Here are a few tips to help you create a great Mystery Box:

- A Mystery Box should contain no more than ten items. (7 to 10 items is ideal.) If a Mystery Box has too much stuff in it, the building challenge becomes less challenging.
- Include scissors and tape. At CCM, we use masking tape because it's easier to peel off than clear tape. The peeling off factor is important if you plan to break down participants' creations and reuse their materials, and it makes it easier for participants to change their design half-way through the project. Tape is also creates much less mess than glue.
- Include one large, sturdy item that participants can use as a body or base.
- Include a variety of items, and avoid putting in more than two of the same item.
- Include a variety of textures: a mix of stiff things, bendable things, and things that participants can cut up.
- Include a variety of colors. You want the contents of the box to be exciting!
- Avoid putting writing or drawing implements in the box. Instead, encourage participants to cut materials to form the letters and shapes they need.
- If you are reusing materials that other participants have already used, make sure that you trim off any cut-up pieces. The contents of your Mystery Box might be trash, but that doesn't mean they have to look like trash. They should be inspiring!

Not sure where to start? Below is a list of potential Mystery Box materials. I realize that you might not have access to all of these items, but I hope this list will spark your imagination.

- Paper
- Cardboard
- Fabric
- Ribbon
- Old CDs
- Packing peanuts
- Styrofoam
- Twist ties
- Corks
- Cardboard tubes
- Empty tape rolls
- Bottle caps
- Pop tops
- Plastic bottles
- Puzzle pieces
- Straws
- Coffee stirrers
- Plastic cutlery
- Plastic bottle wrappers
- String
- Any kind of scrap plastic
- Popsicle sticks
- Plastic or paper cups
- Rubber bands

Building Prompts

In addition to your Mystery Box materials, you will need to prepare your building prompts in advance. The building prompt should be just as much of a surprise as the building materials, so make sure that participants do not see their prompt ahead of time. We recommend writing several prompts out on cards or slips of paper so that participants can choose a prompt at random. This will make the prompt selection more fun and will also ensure that you have extra prompts on hand in case some participants finish early (or if everyone wants to do a second challenge!).

CCM scaffolds its challenge prompts roughly by age. For participants ages two to three, the prompts ask participants to build a simple object, such as "a star" or "a hat." The prompts for ages four to five ask participants to build an object or simple character, such as "a hat for a crab" or "a best friend for a unicorn." The prompts for ages six to seven are more situational and include challenges such as "a way to collect water in the desert" or "a fly catcher for a frog who has lost his tongue." Participants ages eight and older have the opportunity to pursue our most complicated challenges. Examples include, "You are Big Foot. You have remained hidden from the world for many years, but now people are close to discovering your hiding place. Create something to keep the people away from your secret world." and, "Aliens have come to Earth in search of their two favorite things: cows and candles. If they

don't find these things, they will get VERY angry. Design a way for Earth to keep its cows and candles safe without making the aliens mad."

The following page contains a list of sample building prompts. Feel free to use these or write your own. If you are writing your own, remember to keep the prompts as open-ended as possible. Also remember that the crazier (more abstract), the better! Once participants become MBC masters, add a twist by asking them to write building prompts for each other.

Sample Prompts

Ages two to three:

- A butterfly
- A flower
- A fish
- A plant
- A robot

Ages four to five:

- A toy for a dragon
- A snack for a fairy
- A playground for elephants
- A house for a mermaid
- A friend for a robot
- A birthday present for a bear

Ages six to seven:

- A way to safely give medicine to a sneezing volcano
- The sun is feeling too sad to shine today. Invent a way to make it happy so that it will shine.
- A huge tornado is heading straight for your house! Create a way to stop it.
- You are a turtle who wants to be a firefighter, but all the other animals say that you move too slowly to save lives. Design a way to help you move faster.
- A giant eagle has you trapped in its nest. Create a way to escape.
- A way to save the dinosaurs from extinction

]

Ages eight and older:

- Your rocket ship has crash landed on another planet, and you are running out of water. The nearest river is 100 kilometers away. Design a way to make sure that everyone in your crew has enough water to drink.
- It is raining chewing gum and everyone is getting stuck in place. Invent a way to stop the rain and get everyone unstuck.
- A music-eating monster is rampaging through the land. The monster is very big and can hurt people who stand between him and his dinner. Everyone is afraid of the monster, but no one wants to stop listening to music. Create to keep the world's music safe without turning it off forever.
- You wake up and discover that you have shrunk to the size of an ant! Invent a way to climb safely out of your bed and get to school/work on time.
- Your cat has gone crazy and has stolen all of your socks! Design a way to collect your socks without getting scratched by your cat.
- You are a space alien who eats shooting stars for breakfast. Normally, you chase the shooting starts to catch them, but yesterday you broke your leg during an interplanetary soccer tournament. Invent a way to catch stars so that you will not be hungry.

Your Role as a Facilitator
The first thing to consider is what type of facilitator you wish to be. Traditionally, the MBC facilitator does not participate in the building challenge but acts a mentor or coach. However, if you plan to use the MBC as a team-building exercise among you and your colleagues, then of course it makes sense for you to take part in the creative process; it just might make things a little trickier logistically. The first part of this chapter discusses the role of a facilitator-coach, and the second part includes some tips on how to be a facilitator-participant.

Facilitator-Coach
As a facilitator in this capacity, your job is to help the participants' creativity shine. One way that you can kick-start participants' critical thinking skills is by designing the constraints of their challenge, which is a fancy way of saying that you are responsible for preparing the building prompts and the contents of the Mystery Box. You are also responsible for explaining how the challenge works and ensuring that the both the building prompts and the building materials are a surprise for participants. Participants should choose a building prompt first and then receive their Mystery Box. Once participants have opened their boxes, they should not be allowed to exchange their boxes or building prompts for new ones. Remember, part of critical thinking is making connections between seemingly unrelated things, so participants will need to find a way to connect their prompt to the items in their box.

Once participants have their prompts and materials, take a step back and let their ideas flow. In some cases, literal steps back are even better, especially if you are working with youth; removing yourself from the creative space might relieve some of the pressure to get approval from an adult. It might be tempting to join in on the brainstorming and building, but remember
that this is the participants' creation (you can work on your own another time).

So once you've sent the participants off with their supplies, your job is to sit and wait for them to show you their creations, right? In theory, yes, but when have theory and practice ever perfectly aligned in your life as an Educator? Most likely, you will need to step in at some point and provide some encouragement or mediate a dispute. The MBC is hard, and it might be overwhelming to someone who has never worked with these sorts of constraints before. It can also be difficult for a die-hard perfectionist to grasp the concept of process over product.

So how can you give participants a nudge of inspiration without nudging them exclusively towards your vision of a psychically-powered teleporter with robotic claw arms and a built-in espresso machine? One strategy is to select one object from the Mystery Box materials and ask what this one object could be. Participants might be so overwhelmed with possibilities that they are not sure where to begin and just need someone to give them a starting point. Another strategy is to talk about shapes. For example, if participants are stuck on their challenge to build a cage for the moon, ask them what shape they think a cage for the moon would be and then ask if they have any materials that are that shape—or any that they can use to create that shape.

If you have a frustrated perfectionist among your participants, try reminding him or her that the creation does not have to be perfect because it is just a prototype. If you are working with youth, it might inspire them to know that prototypes are something that real inventors use to help explain their ideas. You could also have some images of famous prototypes on hand to show that real inventions did not start out looking perfect, either. If all else fails, agree with participants that the Mystery Box Challenge is hard; that's why it's a challenge!

Working in a group can be challenging for participants of any age, so part of your role as
a facilitator is to moderate group dynamics. You might need to remind participants about the rules of brainstorming and/or about how to give and receive constructive criticism. If you suspect that your

participants might not be familiar with the idea of brainstorming, it might be a good idea to introduce this topic before they start their challenge. For more information about brainstorming and constructive criticism, please “Brainstorming and Constructive Criticism.”

At some point during the MCB, participants might ask if they can trade materials with other groups. This is a tricky question. My instinct is to deny this request because it goes against the idea of turning constraints into possibilities. However, trading would demonstrate collaboration and creativity; after all, “What if we broke the rules?” is one of the most creative “what ifs” there is. I will leave this decision up to you…but not without offering a few suggestions.

If you wish to discourage participants from trading materials, one option would be to ask a group which material it wants to acquire and why. In other words, what will the group use the new material for? Then ask the group if it could use one of its existing materials instead or manipulate some of its existing materials to simulate the desired material. Another strategy would be to establish rules for trading. For example, maybe every member of each group needs to agree on the trade, or maybe there should be penalties for trading. Maybe for every material a group trades, it has to discard an existing material. Better yet, maybe groups cannot trade but can combine their materials to create one prototype that addresses both building prompts. Another option altogether would be to simply ban trading and come back to the idea of trading in the debrief discussion. After participants have finished building, you could ask them how the experience might have been different if they had been allowed to trade materials. You might be surprised by their answers; they might say that trading would have made the challenge much easier. Ultimately, the trading question hinges on what conditions you think will stretch your participants’ minds the most. The MBC should be a challenge because challenges are how we grow.

Throughout your role as a facilitator-coach, you also have the exciting task of asking participants go-beyond questions about their creations. For more information on this topic, please see “Go-Beyond Questions.”

Facilitator-Participants

As a facilitator-participant, you will be interacting with your fellow participants less as a coach and more as a peer, and this role poses an interesting set of challenges. Normally, the facilitator is responsible for preparing the materials for the MBC. Taking on this responsibility might be a little awkward for you if you also plan to help construct a prototype because you would have the advantage of knowing what the building materials and prompts are ahead of time. One way around this problem would be to prepare multiple prompts and boxes and ask your fellow participants to randomly select one of each so that the combination of the two will be a surprise for you. Participants could also divide into teams and create boxes and/or building prompts for each other. Teams would also be a good way to work in go-beyond questions in this facilitator set-up, as the teams could ask these questions of each other rather than answer the questions of a single facilitator.

Facilitating a debrief discussion might also be challenging if you are a facilitator-participant because there will be less distance between you and the subject matter. This lack of distance could be a good thing. Maybe you and your co-workers need an opportunity to analyze your collaboration and problem-solving skills. However, if you think this lack of distance could hinder discussion, you could ask participants to break into new groups for this portion of the lesson. The new groups could discuss a list of questions and report the themes of their discussion to the larger group. This method would allow participants to reflect on their experiences in a more anonymous way.

One way to avoid most of these challenges would be to partner with another educator and serve as facilitators at each other’s work sites. This method would allow you to experience the MBC as a facilitator and a participant separately, rather than trying to fulfill both roles at the same time.

As you can see, there are many ways that you can adapt the MBC to meet different needs. Please feel free to use the MBC in whatever way you think would be most appropriate in your context.

Go-Beyond Questions

They've done it! Your participants have created something super nifty out of only a few surprise materials. Their challenge is over. Not so! As a facilitator, your role is to lead participants beyond the construction stage of MBC and into the equally important explanation stage. Remember, the purpose of the MBC is to get participants to think, and asking participants to explain their creations to you and/or to each other keeps them thinking even after they've put down their tape and scissors.

A great way to start the explanation stage is to simply say, "Tell me about your creation" and let participants take things from there. After that, follow up with some open-ended questions. Avoid yes/no questions and questions that require an either/or response.

Not sure what to ask? Here are a few suggestions:

- Point to part of the creation and say, "Tell me (more) about this part."
- This prompt works well as an icebreaker with shy participants.
- "What if…"

This is a great question to help participants think on their feet. For example, if participants have built an ice cream-powered rocket ship, you could ask what happens when the ice cream starts to melt. If they have built a playground for fish, you could ask what happens when a shark comes.

If participants have created some sort of device, you could ask:

- How many people can use it at one time?
- How long does it take to accomplish its task?
- What is the power source?

If participants have created some sort of character (animal, robot, alien, etc.), you could ask

- What is its name?
- What does it like to do?
- What does it eat?

Go-beyond questions encourage participants to reflect on what they have created. In some cases, a go-beyond question will prompt participants to add another feature to their creation, such as a battery, a filter, or an emergency shut-off. In other cases, participants' on-the-spot responses will blow you away. The explanation phase is often the most exciting part of the MBC, and it is a chance for you the facilitator to flex your critical thinking skills as well. What questions will you ask — especially when the responses you get take you by surprise?

In addition to promoting critical thinking, go-beyond questions validate participants' work in a way that a simple "good job" cannot. By asking questions about a MBC creation, you show that you are interested in it and recognize that the participants who created it have something exciting to teach you. This facilitator-participant relationship is especially powerful if the participants are youth, as they may not be used to having adults take their ideas so seriously.

Remember that, as a facilitator, you are not the only person who is allowed to ask go-beyond questions; encourage participants to ask each other questions as well. Asking each other questions will help participants develop their critical thinking skills even more and will generate a sense of peer validation that may be even more valuable than validation from a facilitator.

Wrap-up Questions
When everyone has run out of go-beyond questions, it's probably a good idea to have a wrap-up discussion about this Mystery Box thing. Here are some suggested questions to spark conversation:

- What did you like about this activity?
- What was challenging? Why?
- What can we learn from the Mystery Box Challenge?
- How can we apply what we learned (to this cool project that we're working on)?

Brainstorming
If your participants are not familiar with brainstorming, it might be a good idea to introduce this topic before they start the MBC. CCM teaches that there are four rules for brainstorming:

- Defer judgment
- Go for volume
- Build on the ideas of others
- Encourage wild and crazy ideas

The Paperclip Brainstorm
One activity that CCM uses to teach brainstorming is called the Paperclip Brainstorm. To start, divide participants into groups and give each group a paperclip (or other commonplace object), a piece of paper, and something to write with. Ask each group to brainstorm what the paper clip could be (a fish hook, an earring, a slide for an ant, etc.) Then ask what participants could create if they had a million paper clips. Then ask what they could make with one giant paperclip. Encourage them to fill up all the empty space on their paper and remind them of the rules of brainstorming as needed.

Next, ask participants to vote on their three favorite ideas. A good way to do this is to let each person in the group put a star or a check mark next to his or her three favorite ideas and then count which ideas have the most votes. When participants have finished voting, ask them to combine their top three ideas into one big idea. For example, if their top three ideas are a robot, a necklace, and roller coaster, their big idea could be a robot that makes necklaces and roller coasters — or a robot that is riding a roller coaster while wearing a necklace — or a robot that transforms into a roller coaster and a necklace — or a necklace that has roller coaster and robot charms on it. You get the idea. This activity is a great way to warm up participants' brains and teach them that when we combine our ideas with the ideas of others, we can come up with ideas that we might never have thought of on our own.

Constructive Criticism
How we speak, listen, and share ideas is so closely connected to culture that you'll have to take the suggestions in this appendix with a grain of salt. However, if you are concerned about how your MBC participants are communicating with each other, I hope the following tips will offer some guidance.

Giving Constructive Criticism
Sharing an idea or work is a risky thing to do. Others might not like or understand your thought or creation. What you have to share might cause conflict or leave you ostracized. When giving constructive criticism, the first step is to acknowledge and respect this risk that the sharer has taken. Remember that the sharer could have chosen to remain silent but instead marched into potential danger. That's a big deal.

Another important thing to remember when giving constructive criticism is that you are not criticizing a person; you are criticizing that person's work or ideas. This concept can be difficult for the person receiving the criticism to grasp because we often put so much of ourselves into our work. And our ideas? How can we separate ourselves from our own thoughts?

One way to make criticism more digestible to the receiver is to structure comments as "I" rather than "you" statements. For example, note the difference between the statements, "I think that this robot gorilla could use more opposable thumbs" and "You didn't put enough thumbs on it." "I" statements remind the receiver that you are only giving your opinion of his or her work and not stating a universal truth. The receiver may not like your opinion (ah, and now the giver is the one at risk), but you will have presented your criticism in a way that opens the door for further reflection and discussion.

Starting on a positive note is another way to make your criticism more digestible. When time allows, try to structure your criticism as a "compliment sandwich": open with a compliment, offer a suggestion, and then close with another compliment. If you think an idea or creation isn't working, try to offer alternative thoughts or strategies. Also always try to articulate why you like or don't like something; remember, simply saying, "I love it!" is not necessarily helpful.

The following phrases can help make criticism constructive rather than destructive:

- I think…
- In my opinion…
- I like/don't like this because…
- I am concerned that…
- I am confused about…
- What if…
- Maybe…
- I wonder if…
- Thank you for sharing. (Acknowledge risk and build respect in one simple phrase!)

Receiving Constructive Criticism

Receiving criticism is tough. While I can't promise that this process will ever become totally painless, there are a few things a receiver can do to make a feedback session more productive. As a person receiving criticism, your first objective is to *listen*. Do not interrupt person(s) giving criticism. It might be tempting to defend or clarify your ideas, but wait until the giver has finished before you respond. If the giver does not feel free to speak, you might miss out on his or her valuable comments. Also remember that seeing how others are misinterpreting
your work can provide valuable insight for revision.
After you have listened attentively, ask questions about any aspects of the criticism you do not understand or about any aspects on which you would like the giver to elaborate. If you have questions about specific elements of your work, ask those as well. At the end of the feedback session, thank the giver to show that you value his or her opinion. Also remember that the giver is criticizing your work, not you.

SUGGESTED ACTIVITIES

Here are some activities to help your MBC participants practice giving and receiving constructive criticism.

Discussion. A simple discussion can go a long way in improving how participants give and receive criticism. Below are some sample discussion questions.

- How does it feel to receive criticism?
- What role does criticism play in the creative process?
- What is the role of the person(s) giving criticism?
- What is the role of the person(s) receiving criticism?
- What are some characteristics of constructive criticism?
- What are some characteristics of destructive criticism?

Compliment Sandwich Practice. Divide participants into pairs and give each person a piece of paper and some drawing implements. Give the participants two to three minutes to draw a picture and then ask them all to practice giving a compliment sandwich to their partners. Remind them that how they receive a compliment sandwich is just as important as how they give one.

Phrases Sort. On pieces of paper, write some phrases that one can use to give criticism. Ask participants to categorize these phrases as “effective” or “ineffective” (or “constructive” or “destructive”) and facilitate discussion about their responses. For examples of effective phrases, see the bulleted list on page 34. Below are some examples of ineffective phrases.

- This is terrible.
- That doesn’t make any sense.
- How could you think that?
- That’s a stupid idea.
- That will never work.

You could also throw in some tricky phrases such as “This is great!” or “I like it.” to remind students that criticism is more helpful when it includes an explanation of *why* the giver likes or does not like something.

SAMPLE LESSON PLAN
Adapted from CCM's Innovation Field Trip Curriculum

The following lesson plan outlines the general structure of an MBC experience. Subsequent chapters provide a more in-depth look at specific elements of this structure.

Warm-up:
Ask participants to stand in a circle. Present a pen (or other commonplace object) and say, for example, "This is not a pen. It is a sword." Mime using the pen as a sword. Pass the pen to the person standing next to you and ask him or her to say and mime, "This is not a sword. It is a…" Continue until each participant has had a turn to say and mime what else the pen could be.

Brainstorming/Constructive Criticism Practice (optional):
See "Brainstorming and Constructive Criticism" for suggested activities on these topics.

Construction:
Explain that, today, participants will create something that no one else has ever made before. Divide participants into random groups. Ask each group to select a building prompt at random and read the prompt aloud. Then ask each group to choose a random Mystery Box. Explain that each group must design a prototype to solve the challenge on its card by using only the materials in its box. Once groups open their boxes, they may not exchange their materials or prompts for new ones.

See "Your Role as a Facilitator" for tips on how to interact with participants while they construct their prototypes. Ask participants go-beyond questions (see "Go-Beyond Questions") as they work, especially as they near completion.

Presentation:
Ask each group to share its prototype with the whole group. Ask go-beyond questions and encourage participants to ask go-beyond questions of each other.

Discussion:
Facilitate reflective discussion about the MBC experience. For sample debrief questions, see "Sample Debrief Questions"

Using the Mystery Box Challenge to engage students in class curriculum

The Mystery Box Challenge is a great way to help increase student engagement and develop their critical thinking skills, while deepening their understanding of concepts that can be abstract and complex.

Here are some ways to use this activity as a science-teaching tool:

HABITAT LOSS:
Challenge #1: Polar bears depend on arctic ice to survive. Due to global warming, arctic ice is melting and polar bears have fewer hunting opportunities. They also have more dangerous hunting conditions as there are fewer sea ice platforms and they become farther apart. Design a way to save the polar bears from extinction.

Challenge #2: Salamanders migrate long distances to spawn their young. A large highway has been put in between where the salamanders need to live and where they need to spawn their young. Design a way to save the salamanders from extinction.

WATER CONSERVATION:
Challenge #1: Your town has asked you to build a new water park, but the only water for your entire town (to shower, wash dishes, water plants, etc.) comes out of a single lake. Design a way to build the water park without using all of the town's water.

Challenge #2: The year is 2020 and the earth's freshwater supply has almost run out. Each family only receives 20 gallons a day for everything they need. Design a way for your family to be able to still take showers, brush their teeth, clean dishes, etc.