Who are your audience?

What are their needs?

Schools and teenagers
Families
Independent adults

Science engagement reflection tool *(a science capital research to practice guide)*

Science capital informed experiences will help lead to greater engagement with science for all of our audiences

Language (verbal and visual) Make everyone feel included and that the science belongs to them. Don't distance it or make it feel like the 'possession' of others (e.g. only scientists/engineers do this) Use personal pronouns - you, we, your, our etc. and use gender neutral visual and verbal language and messages. Avoid using jargon or acronyms which is specific to your work. If you need to use key words - explain what it means	**Science content knowledge** New information should feel like a natural extension/stretch of what people already know. Value and build on people's existing STEM knowledge and experiences, at an appropriate level. Find out where there are links to science principles used in your work in the National Curriculum. Where possible, communicate what science is and how it works. It is not just about knowledge; it is a way of thinking, working and exploring the world around us.	**Skills** Tell people what science skills they are using in the activities/ experiences and help them to recognize that they have these skills. Give examples of where and how these skills are used in daily life and show how those science skills are useful in their interests, work and are useful for many jobs, in and beyond science.
Use everyday examples Show examples of where and how your science has useful applications in our everyday lives and can solve real life issues, to make the experience more relevant and meaningful. Don't make assumptions of what people's interests and experiences are. Remember that everyone will be different (and will not the same as you). Where possible ask what visitors care about and help them to connect to that.	**People** Widen perceptions of who does science. Show diverse examples of people who are using science in their work. Talk to visitors about your route to you job and other careers in your field or at your institution. Share the way that you work e.g. if your job involves lots of travel, lots of field work, using exciting new technology. Share that science involves teams of people with many different skills and experience.	**Confidence and ownership** Make everyone feel welcome and confident to contribute in activities/ experiences. Give everyone a role in the experience (both adults and children) and opportunities to share their knowledge and experiences together. Invite them to follow their interests and give them choice and control in activities.
Promote 'science' talk Use questions which get people thinking and talking about the science they have experienced and to help make connections to their own lives. Invite people to share their own stories/experiences and give ideas that will help generate conversation between families, peers and back in their community.	**Extend the experience** Help people to continue making science connections in other places in the museum, and in their everyday lives (home, school etc.) Make the experience last longer by giving people simple ideas and activities to do after they leave the event (e.g. trying out a kitchen science experiment, things to notice on the way home or to school, questions to think about or to research further)	**Positive reinforcement** Reward science knowledge, behaviour and skills. Tell people when they are 'being scientific', 'thinking like an engineer' etc. Leave them with the feeling that 'I can do that' and 'I want to find out or do more'.

Writing learning outcomes

What is learning?

Learning is the process of active engagement and meaningful connection with an experience. It may involve the development or deepening of skills, knowledge, understanding, awareness, values, ideas and feelings. Effective learning and engagement can help people make sense of a subject, feel ownership of it and fuel a desire to find out more.

What makes learning fun?

When planning interactions with visitors think about what makes learning enjoyable and what will appeal to people's different learning styles. This may include:

- **Curiosity**: surprise and intrigue the visitor
- **Personal relevance:** link to their everyday lives and cultural experiences
- **Confidence**: help visitors feel safe and clever (not stupid)
- **Challenge/competition:** encourage visitors to do or learn something new (not too easy or too hard)
- **Control and free choice**: help visitors feel 'in charge' of the experience
- **Play**: encourage playfulness and sensory exploration
- **Communication**: get people talking and stimulate meaningful conversations

What are learning outcomes?

Learning outcomes describe the visitor experience, what we want them to do as a result of an experience, programme or event. Learning outcomes are used to:

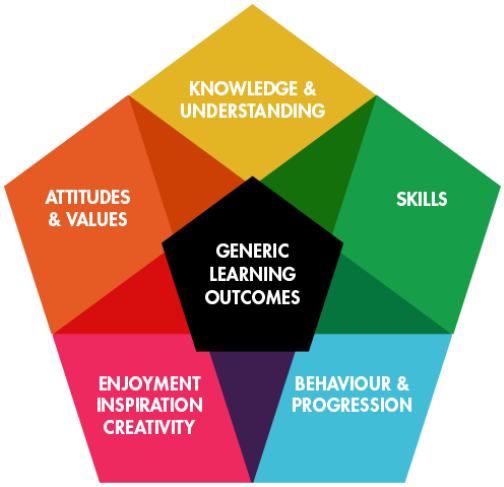
- Plan and shape the development and delivery of an experience or resource
- Define and evaluate the success of the experience against

Things to consider when writing learning outcomes…

- What do you want **everyone** to take away and say about your experience?
- Write up to 3 learning outcomes for any event or resource – any more will be hard to achieve
- A good learning outcome is **observable** and **measurable**
- Try not to start with knowledge and understand (it is the easiest to do)
- What knowledge, attitudes, and misconceptions might people have about the topic or experience? Are your outcomes realistic? Look at educational or visitor research to find out

Generic learning outcomes descriptors

(Mixed MLA and Arts council descriptions with a science capital lens)



Learning outcomes are what we want our visitors to do with the experiences and resources that we create - what they might feel, experience or do.

More than gaining new knowledge; a learning experience can fall under five categories known as generic learning outcomes.

Knowledge and Understanding	· Learn something new · Reinforce/ make sense of prior knowledge · Make new links and associations · Understand the relevance (of science) to people's everyday lives · Understand the learning opportunities of museums/ science centres as a resource · Understand how museums (and science centres) operate
Skills	· Knowing how to do something · Being able to do new things · Recognise using (scientific) skills Inc. observation, asking questions, using evidence, communication, creative problem solving · Use wider subject skills e.g. numeracy, literacy, IT, physical skills · See the transferability of these skills to everyday life (and future jobs)
Attitudes and Values	· Challenge beliefs and values · See that the Museum is a 'place for me' · See there is a wide diversity of people who use science in their work · See (science) as something 'I can do' (in my life today and the future) · Appreciate a range of viewpoints and empathy with others people · Increased motivation/ self-worth
Enjoyment, Inspiration & Creativity	· Inspire interest and curiosity · Make a personal/ emotional connection with a (science) experience · Having fun · Being surprised · Inspire awe and wonder · Be creative · Exploration, experimentation and making
Activity, Behaviour and Progression	· Increase self-confidence and self-efficacy (belief you can do it) · Motivate to investigate further · Inspire people to take part in (science related) activities in their own time · Talking (about science) to others · Share/ recommend their (museum) experiences with others · Have or intend to return after their visit

Key messages

The concept or idea that you want to communicate (Your elevator pitch)

Stand title
Key messages ▪ ▪ ▪

Learning outcomes

What you want visitors to do and take from your experience

Stand title
Key messages ▪ ▪ ▪

Different Learning Styles

Learning Styles	Mode of Learning	Type of Learner
Dynamic learner	Perceive through feeling, touching, seeing and hearing Process experiences through doing	· A 'hands-on' learner · Learns by trial and error, self-discovery · Learns by talking with other people · Likes variety and excitement **Favourite question: IF**
Common-sense problem-solver	Perceive through thinking Process through doing	· Likes solving problems, resents being given answers · Needs to know how things work · Needs hands-on experiences · Shies away from social and interpersonal issues and prefers technical tasks · Function through inferences drawn from sensory experience **Favourite question: HOW**
Analytical learner	Perceive through thinking Process through watching	· Learns by thinking through ideas · Seeks facts · Needs to know what the experts think · Schools are designed for these learners **Favourite question: WHAT**
Imaginative learner	Perceive through feeling, touching, seeing and hearing Process through watching	· Seeks personal meaning · Likes to look at things from many points of view · Learns by listening and sharing ideas · Is interested in people and culture · Would rather watch than take action · Very sensitive to feelings when learning **Favourite question: WHY**

Activity ideas

Introduction

It is important to remember that people learn in different ways. Some like doing activities, whereas others prefer reading information. Some people prefer working alone, others like working in groups. Therefore, it is important to plan your interactions with visitors and include different styles of activity that will appeal to a wide audience.

Ideas include…

Make and take

Participants get to make something they can take away with them. Ideally the activity should allow them to be creative and personalise it in some way. Make sure there are simple to follow making instructions.

Ideas include:

- Craft activities

Quiz

Quizzes are a great way to get groups of people working together in teams and build a competitive spirit. They also encourage families to work together. Make it fun using a variety of materials e.g. images and mystery objects.

Hands-on experiments

Get participants to do short experiments. It should have clear instructions and be simple enough to carry out with limited supervision.

Ideally the results should be instant, but a delayed response means you can encourage them to come back later to check on their experiment.

Ideas include:

- Simulated clinical sample testing
- Optical illusions

Computer interactive/films

Making use of digital technology can be a great way to engage groups with your content. Aim to use a big screen so that others can gather round and watch. Make sure you have an alternative activity just in case the technology fails.

Competitions and challenges

Getting groups to work together as part of a competition is a good ice breaker and builds a competitive spirit. You can update a leader board throughout the event with a prize for the overall winner. Giving live commentary during a timed task means others who are watching can enjoy the experience too.

Object handling

Visitors respond well to beautiful, valuable, nostalgic or curious objects, and like seeing 'the real thing', By being able to touch, smell or even taste objects, visitors engage more senses than just sight, and this can be very powerful.

Ideas include:

- Using unfamiliar objects as mystery objects
- Looking at surprising science behind familiar objects
- Use oversized models to represent things you cannot see e.g. giant microbes

Creating a theme

Organising your activities and the information on your stand into a particular theme is a great way to attract attention and to get people asking questions. This might include wearing a costume, dressing up your stand or encouraging visitors to dress up.

Ideas include:

- Science Museum Lates style events
- Designing graphics with information that people can look at and read
- Using photographs, cartoons or other striking images
- Encourage participation by asking people to contribute their ideas and opinions to your stand

Group tasks

Get groups of students or a family to work together on a task or make something together. You could get them to take on different roles.

Ideas include:

- Problem solving tasks
- Games

Demonstrations

Demonstrate bigger experiments to a larger audience. Use volunteers to help you where possible. Interact with the audience and use comedy to keep them engaged. Have a timetable to let visitors know when the demonstrations will take place.

Powerful questions activity

Introduction

A powerful question or statement can spark the imagination and stimulate a discussion. This activity creates questions that engage your audience by linking topics they enjoy talking about directly with the content you want to communicate.

A good question should be:

Personal

What are your audience interested in and how can you link their interests to the topic? Can you link the topic to something happening in your local area?

Current

Is the topic being reported by the media? Are your audience familiar with it?

Provocative

Could your audience have strong feelings about the topic?

How to run the activity…

Run the activity with your colleagues.

- Working in pairs, use a copy of the template (overleaf) or draw two columns on a piece of paper.
- In the left-hand column write a list of everything that your audience are interested in. Write down as many things as possible (at least ten) in 3–4 minutes.
- The list could include celebrities, fashion, sport, music, local events, gadgets, etc. All references should be specific; for example, give the names of celebrities or TV programmes.

Interests	Topic (e.g. climate change)
Mobile phones	Carbon footprint
Man United	Fossil fuels
The X Factor	Global warming

- In the right-hand column write down all the science concepts/content related to the topic to be discussed

This is where it gets a bit strange, but trust us…

- Turn the list upside-down, then one person picks up a pen and closes their eyes.
- Get them to draw three or four lines to connect the two lists. The other person (with eyes open) helps keep the pen on the paper. (This method generates more interesting results than choosing consciously.)
- Turn the paper the right way up to see what connections you have made.
- Take 3–4 minutes to create questions that link the connected items together. For example, Man United and carbon footprint could become, ‘Should Man United only play local teams to reduce their carbon footprint?’

Write a list of everything that your audience enjoy discussing. Examples could include celebrities, TV programmes, sports, music, fashion labels or local events/news	Write a list of everything that relates to your topic that you are explaining or demonstrating

Generated question and statement ideas:

_____

_____

_____

_____

Visitor interactions

How to hook and engage your visitors

Talking to visitors

- Identify who your audience are. What will they be interested in?
- Have two or three key messages to communicate.
- How might your 'exhibit' or 'science/technology' benefit them?
- What makes your subject unique?
- Are there any common misconceptions surrounding your subject?

Good openers

A smile and 'hello' is a great place to start.

Introduce yourself and what you do.

Maintain eye contact (be friendly, approachable and enthusiastic).

Invite people to take part in a particular activity:

Have you seen ... ?

Would you like to try/hold/see ... ?

Try to gauge interest areas and the level of knowledge of your visitors at the outset and tailor your response accordingly. Ask questions such as:

Have you ever heard about ... ?

Are you interested in ... ?

Avoid using openers like:

Can I help you?

Are you OK?

Do you have a science background?

Good closers

Thank people for their interest and time:

Thank you, it was lovely to talk to you.

Introduce visitors to another activity or encourage them to find out more by making a link:

You might be interested in having a closer look at ...

You can find out more about this on our website/in this brochure.

Give ideas for extending the experience by connecting to their lives or remind them of the skills or science knowledge they have used.

Thank you for taking part. Next time that you are walking to school look out for…

You have been working like a scientist using problem solving skills, observation etc.

Or you can apologise for interrupting and politely explain that you need to talk to other waiting visitors.

Keeping the conversation going

Your interactions with visitors should be two way, in the form of a conversation rather than a monologue. Try and keep the conversation going by asking questions such as:

What do you think about ... ?

How do you feel about ... ?

How could you use ... ?

Does this remind you of anything?

Avoid...

- Talking to visitors for too long

  Look out for signs that they have disengaged – looking across the room, reaching for their phone, getting fidgety or looking at their watch are usually good indicators that people want to move on!
- Pitching your explanations too high or too low
- Telling people **everything** you know or following a script
- Making people wait for your attention or not acknowledging interested visitors

Top tips for running a demonstration

- Have a definite beginning and end
- Use this simple structure:

  Tell them what you are going to tell them
  Tell them
  Tell them what you told them
- Involve your visitors by asking them questions
- Use volunteers

Royal Society Summer Science Exhibition

Check list

Team briefing

- [ ] Agree your learning outcomes and key messages
- [ ] Plan a training course with the rest of your team based on your audience engagement training
- [ ] Hold a briefing with all the members of your team so that they are all confident about their roles and their interactions with the public

Stand ideas

- [ ] Plan activities for your stand e.g. object handling, demonstrations, make-and-take activities, and an activity for young children. Also consider an activity that could be completed at home or on the way home
- [ ] Plan and practice some good openers and closers
- [ ] Prepare a sheet of frequently asked questions for your stand
- [ ] Source giveaways/ rewards for visitors to take away (if possible linked to your topic)

Practical points

- [ ] Find out information about the venue, e.g. location of toilets, café, nearest transport, nearest information desk.
- [ ] Prepare an emergency kit to make repairs to your stand? (Include scissors, string, Velcro, sticky tape, elastic bands, gaffer tape, Blu-tack, etc.)
- [ ] Have drinks and snacks available to keep your teams energy levels up

Reflection and evaluation

- [ ] Reflect on your visitor interactions and discussions using the science engagement reflection tool - before, during and after the event
- [ ] Plan a way to evaluate/ capture visitor's response to your stand and interactions