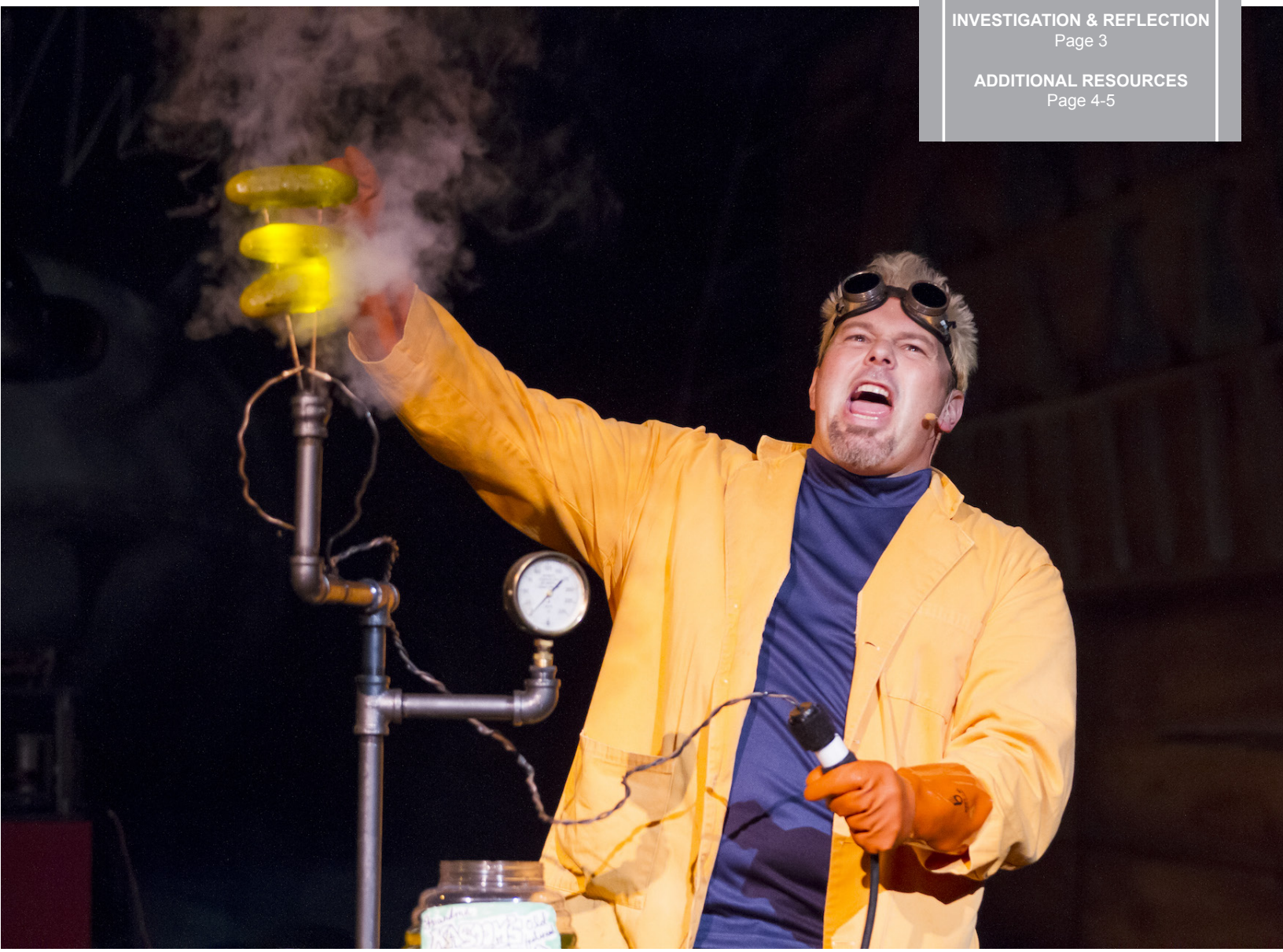
Teacher Guide

TABLE OF CONTENTS



Applause Series

Doktor Kaboom: The Wheel of Science

Tuesday, November 14, 2023

DES MOINES PERFORMING ARTS

Enduring Understandings

Overarching (aka, "big") ideas that are central to the core of the artistic discipline and may be transferred to new learning beyond the experience.

1. Scientists have particular methods for exploration and seeking answers.

2. The Scientific Method can be used in unexpected circumstances to test our assumptions and help us define the problem.

3. Having a process to gain information and test our knowledge helps us be able to share with others our methods and what we've discovered.

Want to Explore More?

Check out the Student Exploration Guide here!

Inquiry 01 Connecting to Self

Do you prefer to understand the why behind mysteries in your life - to have things explained though science? Or do you prefer the unknown? Have you ever created a science experiment in your real life to figure out a problem? Write about it and share!

Have students respond with their connections after a five minute quick write.

Inquiry 02 Connecting to Art

How do the music, lighting and "acting" or presentation skills of Doktor Kaboom contribute to the performance? How would the performance be different if it didn't have music or special lighting cues? What did you notice about the way he used his voice and comedy to reach the audience and teach them about science?

Ask students to make a list of 10 observations that they made about the performance. Then, discuss with a partner and attempt to add five more to their lists. Discuss the performance as a whole group recalling specific evidence from the performance to support students' thoughts. Ask, "What makes you say that?" in response to their conclusions to encourage using close observation as evidence.

Inquiry 03 Connecting to Science or Social Studies

Science is often seen as a very serious subject - one with lots of rules for safety and specific structures to make sure the results are valid. How does Doktor Kaboom approach science in a different way? What other scientific discoveries have been made in less serious ways - by accident or by "messing around?" Is this still science?

Use the document on page 4 & 5 of this guide to research three inventions that were created "by accident" and remain popular today. After reading ask students how these inventions do or do not fit in with their definition of science.

Investigation

Use this glossary to connect the elements of theater to what you experienced during the performance. We put a star by some of the terms that we think you will spot on stage.

THEATER GLOSSARY

THOUGHT

The big picture of the play

GENRE:
relating to a specific kind or type of drama and theater such as a tragedy, drama, melodrama, comedy, or farce

GIVEN CIRCUMSTANCES:
the underlying actions and events that have happened before the play, story, or devised piece begins

FOCUS:
a commitment by a participant to remain in the scope of the project or to stay within the world of the play

IMAGINARY ELSEWHERE:
an imagined location which can be historical, fictional, or realistic

THEME:
the aspect of the human condition under investigation in the drama; it can be drawn from unifying topics or questions across content areas

THEATRICAL CONVENTIONS:
practices and/or devices that the audience and actors accept in the world of the play even when it is not realistic, such as a narrator, flashback, or an aside

ACTION

The events of a play; the story as opposed to the theme; what happens rather than what it means.

CONFLICT:
the problem, confrontation, or struggle in a scene or play; conflict may include a character against him or herself, a character in opposition to another character, a character against nature, a character against society, or a character against the supernatural

OBJECTIVE:
a goal or particular need or want that a character has within a scene or play

PLOT:
a narrative as revealed through the action and/or dialogue; traditionally, a plot has the elements of exposition, inciting incident, conflict, rising action, climax, and resolution or falling action

CHARACTERS

These are the people presented in the play that are involved in the perusing plot.

BELIEVABILITY:
theatrical choices thought to be true based upon an understanding of any given fictional moment, interpretation of text, and/or human interaction

CHARACTER TRAITS:
observable embodied actions that illustrate a character's personality, values, beliefs, and history

GESTURE:
an expressive and planned movement of the body or limbs

INNER THOUGHTS:
the underlying and implied meaning or intentions in the character's dialogue or actions (also known as subtext)

MOTIVATION:
reasons why a character behaves or reacts in a particular way in a scene or play

LANGUAGE

The word choices made by the playwright and the enunciation of the actors of the language.

DIALOGUE:
a conversation between characters

IMPROVISE:
the spontaneous, intuitive, and immediate response of movement and speech

SCRIPT:
a piece of writing for the theater that includes a description of the setting, a list of the characters, the dialogue, and the action of the characters

MUSIC:
Music can encompass the rhythm of dialogue and speeches in a play or can also mean the aspects of the melody and music compositions as with musical theatre.

SPECTACLE

The spectacle in the theatre can involve all of the aspects of scenery, costumes, and special effects in a production.

NON-REPRESENTATIONAL MATERIALS:
objects which can be transformed into specific props through the imagination

PRODUCTION ELEMENTS:
technical elements selected for use in a specific production, including sets, sound, costumes, lights, music, props, and make-up, as well as elements specific to the production such as puppets, masks, special effects, or other storytelling devices/concepts

STAGING:
patterns of movement in a scene or play

Reflection

Listen to music while responding to these questions in whatever format makes sense to you - writing, drawing, recording a video or responding with technology.

- What did you see? How could you draw it?
- What was your favorite part?
- What did you hear?
- What did you imagine? What idea came to your mind? What do you wonder about?

We love to hear from you. Please send any of your responses to the performance to us at education@dmpa.org. We'll share the responses with the artists and Applause Series donors.

ACCIDENTS Happen

BUT SOMETIMES THEY RESULT IN AMAZING DISCOVERIES!

Accidents can be *really* embarrassing. But from time to time these oopsies lead to something awesome. Check out these three *fortunate* mishaps...

THE INVENTION: MICROWAVE OVEN

THE "OOPS!" MOMENT: **Accidentally melting a chocolate bar in a pocket**

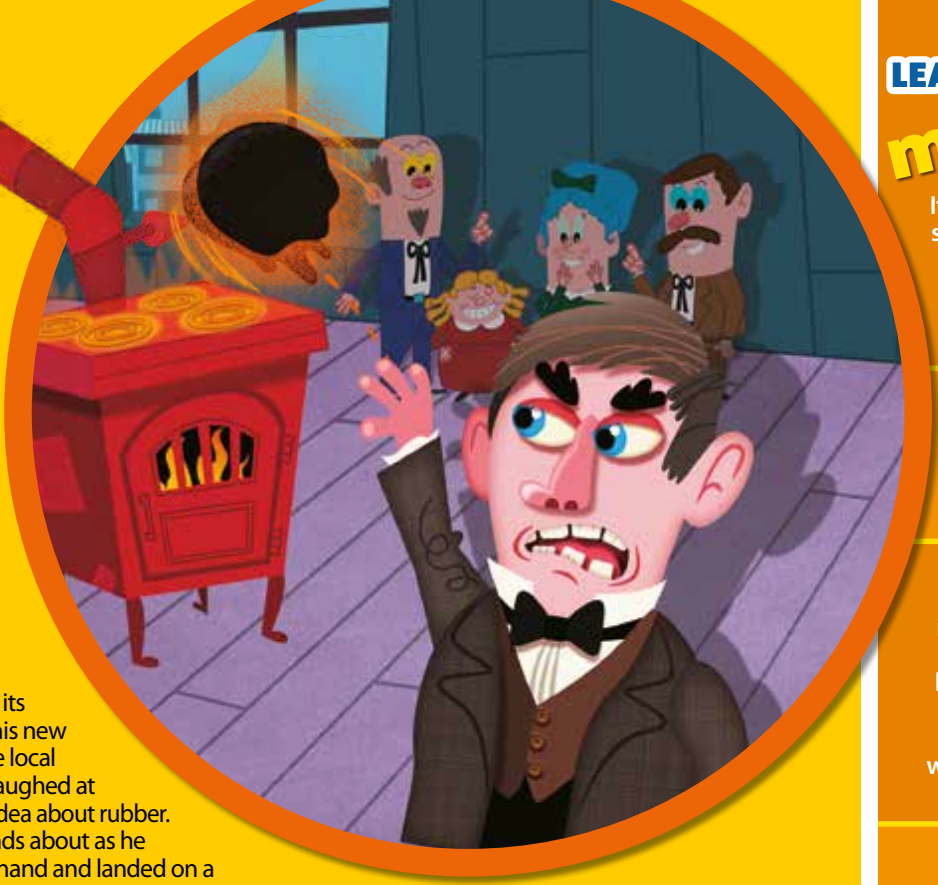
THE DETAILS: **Percy Spencer** wasn't *trying* to find a quick way to cook food. It was the 1940s, and he was experimenting with radar — radio waves used to detect objects. But as he walked around the lab, he stepped in front of a 'magnetron' — a device in radar sets that makes short electromagnetic waves called 'microwaves'. Spencer didn't think much of it... until he reached into his pocket and pulled out a chocolate bar that had turned into a gooey mess!

STICKY SURPRISE

We now know why that happened — microwaves excite water molecules in food, which causes the molecules to vibrate and give off heat generated by internal friction. But Spencer had to find that out for himself... first, he aimed a beam of microwaves at some kernels of popping corn. The kernels burst and popcorn flew everywhere. He then zapped a raw egg, which exploded in his lab partner's face!

Spencer's discovery that microwaves could heat food superfast, from the inside, led to the first **microwave oven** — a ginormous 340kg gadget about the size of a fridge! Imagine trying to put that on your kitchen worktop!

THE INVENTION: DURABLE RUBBER



THE "OOPS!" MOMENT: A temper tantrum

THE DETAILS: America was hit by 'rubber fever' in the early 1800s — lots of items, including clothes and footwear, were made out of the material. Trouble was, these objects either melted into a sticky pile of goo in heat, or cracked in the cold.

But hardware merchant **Charles Goodyear** was determined to figure out how to turn natural rubber into a material that could stand up to extreme heat and cold.

TEMPER, TEMPER

In 1839, after years of experiments, Goodyear had a new plan — he'd add sulphur to the rubber to change its properties. Armed with a sample of his new rubber formula, he went down to the local general store, but people there just laughed at what they thought was another silly idea about rubber.

Angered, Goodyear waved his hands about as he shouted. The mixture flew out of his hand and landed on a hot stove. And when he went to prise it off, he found a substance that was hard, like leather, but still elastic — a substance later called **vulcanized rubber** that's similar to what we use today to make everything from wellies to bicycle tyres. By adding heat to his new mixture of rubber and sulphur, he created rubber that was elastic, strong and stable. Goodyear's temper had accidentally found the key to a great discovery!

LEARNING FROM mistakes

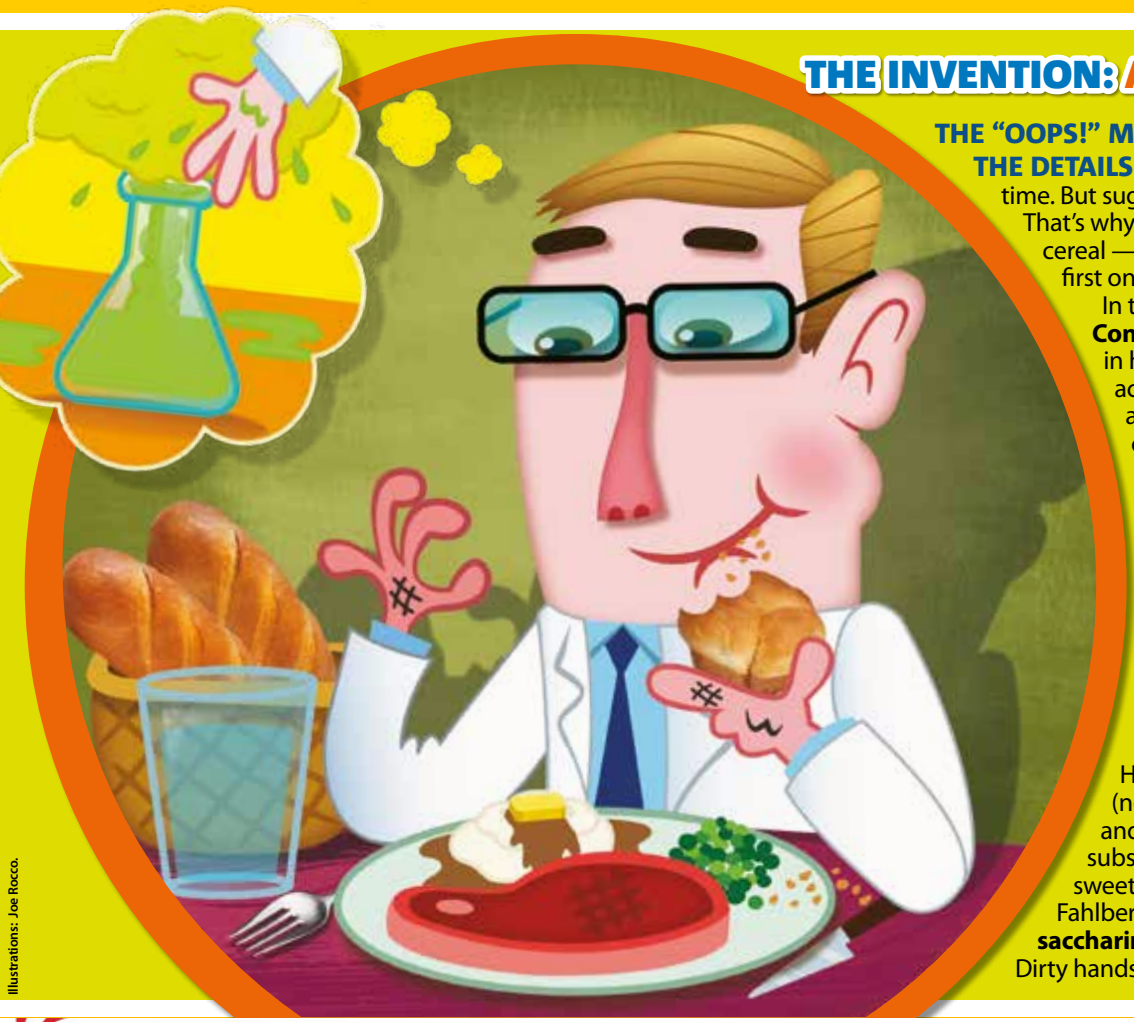
If these inventions show us anything, it's that we all make mistakes — and that's not always bad.

Mistakes often take us in new directions — and help us learn new things.

People who say something is impossible aren't always right. A lot of things were 'impossible' — before someone worked out how to do them.

If you don't succeed straight away, don't be afraid to try again and again, and again — and again!

THE INVENTION: ARTIFICIAL SWEETENER



THE "OOPS!" MOMENT: Dirty hands

THE DETAILS: We all like a sweet treat from time to time. But sugar can be too much of a good thing. That's why a lot of foods — from fizzy drinks to cereal — contain artificial sweeteners. And the first one was actually a tasty surprise.

In the late 1870s, German scientist **Constantin Fahlberg** was hard at work in his lab when a beaker of chemicals accidentally tipped over. He cleared away the mess but the harmless chemicals were still on his hands.

SWEET SPLASH

Without pausing to wash, Fahlberg carried on with his work and then went home to eat. Sitting down at the table he began his meal, picking the food up with his dirty hands. But he noticed his bread tasted strangely sweet — something on his hands had transferred onto the bread. What was it?

The chemist rushed back to work. He licked and tasted everything in sight (not exactly the smartest idea in a lab!), and found what he was looking for — the substance in the beaker that had spilled was sweet, much sweeter than sugar.

Fahlberg eventually named his discovery **saccharin**, the world's first artificial sweetener. Dirty hands? Delicious!

Illustrations: Joe Rocco.