IDENTITY

K–12 Educator’s Guide

Do you see a hand like yours here?

The shapes of our hands, fingers, and nails are largely determined by your DNA.
IDENTITY
AN EXHIBITION OF YOU
IDENTITY: AN EXHIBITION OF YOU
invites students to explore their unique physical, psychological, and social identities.

Through a series of hands-on, interactive, and situational experiences, they will discover how science is providing new insight into the way we think about our personal identity. Students will realize how complex and multi-dimensional our bodies and personalities are, and that they are shaped by factors we can control and factors we cannot control. The classroom activities presented here in this guide could be used in preparation for a visit to the exhibit or as extension activities after returning to school. Either way, students will be able to connect the activities with their experience in the exhibit.

Students will likely have some abstract prior knowledge about DNA and how it determines their physical identity. The experience of extracting and visualizing one’s own DNA, however, is key to making this abstract idea become concrete and real. Your students may be participating in a DNA extraction workshop as part of their field-trip experience. If not, the simple DNA extraction activity presented here can easily be done in the classroom to provide a similar experience.

The content in the exhibit and the activities in this guide are presented in context with national curricular standards for science, social studies, mathematics, and language arts.
HOW TO PREPARE

Who am I?
Challenge your students to think about this question, the answer to which is central to understanding one’s own identity.

How did I become who I am?
Engage your class in a discussion of the elements of identity: the physical, the psychological, and the social.

How do others see me?

“Identity: An Exhibition of You” is provocative and compelling. It brings sensitive issues to light and challenges us to think about ourselves and our interactions.

QUICK TIPS

- The exhibit has three parts: physical identity, psychological identity, and social identity.
- The learning experience is greatest when students engage with the numerous interactive media stations scattered throughout the exhibit. For logistical reasons, however, you might recommend that students work in small groups in order to enable everyone to use all of the stations.
- On average, most groups will spend about 45 minutes in the exhibit.

WHAT TO EXPECT

While you and your students visit the exhibit, you will:
- Explore the scope and limits genes have on the way we look (our physical identity).
- Examine how differences in the way our brains work impact the way we think (our psychological identity).
- Investigate the impact other people have on how we define ourselves (our social identity).
- Be inspired to view our own identity and the identity of others with new eyes.

When you and your students leave the exhibit, you will understand how:
- Our identity is complex and multidimensional.
- Science is challenging the way we think about personal identity.
- Our identities are shaped by elements we can and cannot change.

Throughout the exhibit, you will see how we use the FAMILIAR (our body, our thoughts, our relationships) to make connections with the SCIENTIFIC (our genes, our brains, our roles in society).
The exhibit experiences are grouped into three areas associated with the three aspects of identity: the physical—where we connect our BODY with our GENES; the psychological—where our THOUGHTS connect to our BRAINS; and the social—where our RELATIONSHIPS lead to our ROLES IN SOCIETY.

As you move through the exhibit’s physical space, you will find devices and interactive media stations grouped accordingly. The following overview will help you plan your time in the exhibit.
ENTRANCE/ORIENTATION

The orientation provides an overview of the exhibition content with an opportunity for creative play giving a sense of the greater experience inside.

THE THREE OF ME

As you and your students move into the exhibition, you will encounter silhouettes of yourselves projected onto a large screen, mirroring your motions. The silhouettes are filled with images related to the three areas of the exhibition. Handwritten statements/questions come to life, scribbled across the screen. They vary in size, writing style—clearly from multiple hands, multiple people. These questions foreshadow the experience upon which your students are about to embark.

What does science say about who I am?

Do genes determine everything about me?

We all think differently. Why?

What kinds of social groups do I identify with?

What relationships matter most to me?

What makes me unique?
PHYSICAL IDENTITY
How do genes impact my physical body?

- Most of our physical identity is determined by genes.
- Our genes are inherited.
- Our genes don’t determine everything about our physical identity. Environment also has a role.
- Don’t fear! Love your genes. They are the starting point to your unique identity!

INHERITED IDENTITY VIGNETTE
This playful montage invites your students to be open to learning more about themselves in humorous and creative style. Learners are urged to ask, “What do my genes say about me?” They walk into a crowd of projected individuals ranging in age, body type, and ethnicity. The individuals look at the students as they speak about their “inherited identity.” Each tells a story about why they look a certain way, how genes have influenced their physical traits while also connecting them to other family members, mannerisms they share with relatives, their ethnic background, and how important their physical identity is to them. The vignette inspires students to respond in spirit and emotion to the stories of others.

MEASURING YOUR PHYSICAL IDENTITY
In this section, students take a closer look at their physical appearance. Mirrors and magnifications play an important role here. As they examine their physical identity, they begin to make connections between their physical appearance and the role of genes.

EXAMINE YOURSELF
Students begin by measuring their body inside a mirrored area. In doing so, they explore their own proportions and how their height is related to genes and the environment. Accompanying graphics encourage them to examine their skin color and learn about the science of skin color.

FINGERPRINTS
Students take their own fingerprints and compare them from hand to hand. They study themselves and learn that they are so unique that even a person’s right hand is different from the left hand. Students will identify the various fingerprint patterns.
MAKE YOUR FACE USING A MAGNETIC BOARD AND A MIRROR
Students study their face and select eyes, nose, mouth, and ears and that most closely match their own.

MIRROR OF INHERITANCE
Students examine themselves in a mirror and identify traits that have a strong genetic component (e.g., hair color, eye color, widow’s peak, etc.).

YOUR INHERITED IDENTITY
In this section, students investigate how parts of their identity are inherited and passed down through genes. By framing the content through the lens of inheritance, they start to think more about their family and their physical connection to its members and their own genetic identity. This area also focuses on how physical appearance is not completely determined by genes. Genes are the starting point to our physical identity, but over time environment plays a larger role.

SIBLING SLOTS
An interactive media station invites students to discover the chances of having siblings with matching sets of DNA. They can do this multiple times and compare and contrast the resulting children. Students will find that the chances of having siblings with exactly the same set of genes—even with the same parents—is astronomical.

FAMILY MATCH UP
Students match up four sets of families using pictures and corresponding DNA. They see if their match is correct by lifting a reveal that shows the correct family unit and a corresponding fun fact about genetic inheritance.

IS YOUR FACE SYMMETRICAL?
Students sit in a booth, align their face to a guide, and click on a button to take a picture. Two composite images of the face are created: one face is based on the right half and one face is based on the left half. Students will understand that while their faces have a genetic component, over time environment can influence it as well.

YOUR FUTURE SELF
Using an interactive media station, students can age their faces over various time increments and then choose the amount of UV to expose themselves to over a lifetime via unprotected exposure to the sun. Depending on their choices, they watch their face age in healthy or not so healthy ways. Students will see that they can impact the way their genes are expressed.
• Our personality is based on the way our brain functions and its unique chemistry.
• Differences in our brain chemistry, brain structures, and brain activity impact our identity.
• There are differences between male and female brains, but there are similarities as well.
• Embrace the unique way in which you think!

Students transition into this section with an awakened appreciation of their physical identity and the influence of genes. They now turn their focus to how the brain is central to their identity, and how the way they think is based in both fixed aspects (such as brain structure, function, and chemistry) and changeable elements (such as their surrounding environment). Students will become more aware of their thoughts and how individuals think differently, discovering how their identities can also be found in the ways that they think: I have a complex personality; My brain structure determines how I process my thoughts.

PERSONALITY VIGNETTE
Students are prompted by a key question: “Who do you think you are?” They see 5 small round tubes labeled with 5 different words: “curious,” “social,” “cooperative,” “organized,” and “dreamer.” From the outside, the tubes appear quite distinct from each other via the use of light, movement, and color. The student should choose one in answer to the question. Inside each tube is a voice—the voice of a person engaged in a first-person account of what it is like to have a particular personality. As they listen to the stories student ask themselves, “Is this how I think?”

MEASURING YOUR PERSONALITY
In this section, students take a closer look at their personalities. As they examine their personalities, they begin to make connections between their personality and their brain, its function and its structure. Images of the brain at work—fMRI’s, self-portraits, and journals—give the understanding that you can see the workings of your brain in many ways. Here, students see what the brain looks like, how it functions, and what makes us think differently. By connecting our personalities with our brain function, students see the intricate connection between some of the intangible qualities of identity and the tangible workings of the brain. Students then explore differences between male and female brains. The understanding of the differences is based in scientific research that shows the distinctions as well as the similarities in the brain function and structure.
INTROVERT VS. EXTROVERT
At an interactive media station, students view positive images and rate their reaction to each. They discover how the way they react to positive images relates to their personality. Extroverts find positive images more pleasant than introverts.

REACTIVE VS. RESILIENT
Students view negative images and rate their reactions. They discover how the way they react to negative images relates to their personality. Reactive personalities have a heightened reaction to negative images.

(*Note: The images in this experience may provoke extreme reactions from some students.*)

EXPLORER VS. PRESERVER
Using sniff bottles, students encounter unfamiliar smells. Depending on their personality types, they are either attracted to or turned off by the smells. They discover how open they are to new smells and learn what that says about their personalities. Explorers find new smells and other new experiences more attractive.

CHALLENGER VS. ADAPTER
Students watch a video and see how a challenger personality and an adapter personality each handle a social situation in a very different manner.

FOCUSED VS. FLEXIBLE
Students look at pictures of individuals’ desks and workspaces and predict how focused or flexible the individuals are. In studies, individuals could accurately predict 3-4 of the big 5 personality traits by only looking at their cubicles. People are surprisingly good at assessing people when they look at non-physical characteristics.

LISTEN TO A SPECTRUM
Students will “hear” their personality mapping each personality trait onto an equalizer. They set sliders in response to questions about their personalities. The resultant melody is a musical representation of personality.

TOUCHABLE BRAIN
A touchable brain introduces the central role the brain has on identity. Students touch a particular area of the brain on a touchscreen and watch an associated video presentation of an identity disorder related to that part of the brain. An fMRI of that section also appears, giving the student a first-hand view into brain function.

SUBWAY RIDE
Students approach a panel of animated individuals sitting on the subway after it has just come to an unexpected halt. Moving a video screen on a rail, students select any one individual to see how they are reacting to the situation. They can then raise or lower the levels of specific chemicals in that individual in order to see how the individual’s responses change based on the input of these chemicals.
BRAIN CHEMICALS
Students explore the impact of having one or two short version(s) of the “stress” gene by attempting to stress out two individuals to “send” a critical amount of serotonin up a track to the brains of two different individuals. Individual #1 has twice as many serotonin transporters as individual #2. People with more serotonin transports are less stressed than people with fewer.

IN THE WOMB
Students view two side-by-side videos of a male and female fetus growing in the womb. At first, both seem to be growing in identical ways, but towards the end of development differences between their brains appear. Advances in ultrasound imaging help highlight these differences.

MALE / FEMALE BRAINS
At an interactive media station, students answer a series of questions to determine their abilities to perform various tasks. In the process, they learn about differences and similarities between male and female brains. Students discover that they are good at different types of tests, and that these tests are linked to the way their brain is structured.
SOCIAL IDENTITY

How do people influence my identity?

- People help shape our identity.
- We classify others and ourselves into groups, sometimes these classifications make sense, other times they can be misleading.
- No person is an island. Appreciate the impact other people have on your identity!

Students next move into the section which will help them understand how other people impact their identity. While students may have always thought of themselves as individuals, they will begin to see that other people have a great affect on who they are.

SOCIAL BOUNDARIES VIGNETTE

Students step onto a “dance floor” and are met with this bold question: “How do other people affect who you are?” They embark upon a playful, group experience where there is a projection of their personal space as defined by a boundary line and color. When a second person steps onto the dance floor, the space around them is defined as well. As more people arrive, the smaller the personal space becomes. What happens as you move closer to another person? How does your personal space react to theirs? What happens to your boundaries? Your color? When one person touches another, what happens?

This section focuses on how we interact with others. We classify people, we change our actions, we make judgments, and we group ourselves into “us” and “them.” A series of experiences let students map their social interactions. These experiences set the stage for deeper discussion of race and gender as social constructs. We classify others and ourselves into groups; Sometimes these classifications make sense, while at other times they can be misleading. Contrary to common thinking, race is based in your social identity, not in your genetic identity.
WHO DO YOU INTERACT WITH?
Using magnets representing various individuals, students construct the relationships or sociograms they have with other people. Arrows further indicate the context of the relationships. After they map their relationships, they then identify the various groups to which those individuals belong.

WHAT PEOPLE DO YOU IDENTIFY WITH?
At an interactive media station, students take two implicit association tests for identity to see with which groups they subconsciously identify versus the ones with which they just say they identify.

WHO ARE YOU NOW?
Students watch videos of an individual talking to people off camera. They try to guess to whom the individual is talking based on the way he speaks and presents himself. Students will discover that individuals assume different “roles” depending on to whom they are talking.

US VERSUS THEM
Students take an implicit association test that arbitrarily groups them with a particular group and then lets them classify various things associated or not associated with that group. Students find that they quickly identify with the group and elevate the status of their group at the expense of others.

HOW IMPORTANT IS YOUR ETHNICITY TO YOU?
Students answer a set of ten questions to evaluate the relevance of their ethnic identities. They can compare their answers with others.

ROADS NOT TAKEN
Videos feature sets of people from similar backgrounds talking about their experiences and how those experiences impacted their integration into ethnic or mainstream identity.

WHO SHARES YOUR SKIN?
Students turn a wheel and examine how their skin color can belong to people of different “races” and ethnic backgrounds. Students discover that their skin can belong to many different types of people and skin color alone cannot be used to group people into “races.” In fact, proximity to the equator is the more common characteristic.

WHO ARE WE?
Students see images of people from various backgrounds and unwittingly start to classify the individuals. When they get closer, however, they discover that there is a surprise associated with their identity that isn’t
SEE YOURSELF IN A NEW GROUP

At an interactive media station, students take a digital picture of their face. They can then manipulate the image to see themselves represented as different ethnicities or the opposite gender.

DESCRIBE THIS BABY

Students are asked to apply adjectives to describe babies. Some babies are wearing dresses, while others are not. The babies are all smiling, cooing, or moving in similar ways. At the end, the student discovers that each baby appeared twice—once dressed as a girl, once as a boy. Did they use different adjectives to describe the baby? If so, it indicates how social cues influence opinion and issues of gender bias.

SCIENCE AND GENDER BIAS

Students take a “rapid implicit association test” designed to probe for biases. They quickly sort into two columns four categories of words: fields of study in the sciences; fields of study in humanities; males; and females. Results tend to show a mental bias against associating women with science careers.

THE ART OF I AND THE IDENTITY COLLAGE WALL

What makes me who I am?

MY UNIQUE IDENTITY

As students move toward the end of the exhibition, they encounter silhouettes of themselves mirroring their actions. The experience reminds them of when they entered the exhibition. The silhouettes distinguish the three areas of the exhibition, but this time there is an invitation to define their unique identities by adding characteristics to their silhouettes.
CLASSROOM ACTIVITIES

PHYSICAL IDENTITY – EXTRACT DNA!

PSYCHOLOGICAL IDENTITY – THINK COLORFULLY!

SOCIAL IDENTITY – SEE THE NETWORK!

EXTRACT DNA!

In this activity, students will see their own DNA.
The purpose is to help them recognize the central element of their physical identities.

You’ll need:
A small clear glass beaker with a narrow mouth.
(If you don’t have beakers, a clear juice glass will do.)
½ liter of drinking water in a beaker or large glass, room temperature.
1 tablespoon of ordinary table salt
1 bottle of rubbing alcohol, chilled (Isopropyl alcohol USP 70%)
Blue food coloring
A pipette or medicine dropper
Clear dishwashing liquid – any brand, as long as it’s not colored
Glass or plastic stir stick (If you don’t have laboratory equipment, a plastic knife will do.)
Measuring spoon or graduated cylinder
Rubber gloves
Safety glasses

Directions:
Chill the Isopropyl alcohol overnight.
Put on glasses and gloves.
Pour 1 tablespoon of the salt into the drinking water. Stir until salt is dissolved.
Use measuring spoons or graduated cylinder to transfer a sample of 3 tablespoons of the salty water into the small glass beaker or juice glass.
Pour the sample of salty water into your mouth. DO NOT SWALLOW! Swish the salty water around inside your mouth for about 30 seconds. Spit it back into the cup. You have just collected living skin cells from the inside of your mouth.
You now need to add just a drop of the clear dishwashing liquid to the sample. Carefully add a drop to the water and use your stir stick to mix it together gently. Be careful not to create foam. Stir just once, just enough to break the detergent’s drop membrane. The detergent will break open the membranes of the skin cells, releasing the DNA from the cell into the sample.
Add about 3 drops of the blue food coloring to your bottle of chilled rubbing alcohol. Replace the cap tightly and shake until it is mixed well.
Fill your pipette or medicine dropper with the blue alcohol. Hold the glass containing your sample at a slight angle so that you can gently release a slow stream of the alcohol down along the inside wall of the glass. The alcohol needs to rest on top of the water, so make sure it doesn’t mix with the water below. Continue releasing streams of blue alcohol until there is a complete layer resting on top of the salty water. You don’t need to measure it, but it should be approximately 2 centimeters. Not too thin, not too thick. *Note: If your blue alcohol mixes with the salty water, you’ll need to discard the sample and start over.
Now, watch as thin strands of your DNA begin to migrate and collect in the alcohol layer. As more and more gather, they’ll begin to join together and become visible. Look for webs or mesh-like structures. That’s your DNA! It contains your genetic code—the biological basis of your identity!
THINK COLORFULLY!

Our psychological identity colors our worldview. The purpose of this activity is to compare and contrast how our prior life experience interferes with what we see.

You'll need:
Stroop Test Sheets (1 for each student)
Stopwatch/Timer
Pencils/Pens

Directions:
Working with a partner, you will take a Stroop Test which was developed by a psychologist named J.R. Stroop during the 1930s. One person will take the test while the other works as the timekeeper and data collector. Then, switch roles.
After both of you have taken the test, compare and contrast your results. Who was quicker? Who was more accurate? Who struggled more?
Your results indicate the levels of interference in your attention to information. If it took you longer to get through the list, then you have a higher level of interference. Less time means less interference. Those interferences are indicators of how you perceive the world—your psychological identity.
THINK COLORFULLY!

Stroop Test Sheet

Directions: When you are ready to begin, say “go” and your partner will time you. Say out loud the COLOR of each word on the list below. Do not read the word. Say its color—the color of the ink. Your partner will keep track of your mistakes. When you are finished, say “stop.” Record your time on the data sheet.

<table>
<thead>
<tr>
<th>Test Time:</th>
<th>Number of Mistakes:</th>
<th>Percentage of Mistakes:</th>
</tr>
</thead>
</table>

After you and your partner have taken the test, compare your results.

**Discussion Questions:**

What do you think would happen if a person who was just learning to read English took this test? What do you think would happen if the words were not the names of colors? Would it be harder? Can you think of any other kinds of tests that might help you see how the brain interferes in the way we see the world?

Blue    Orange    Yellow
Green   Purple    Red
Yellow  Red       Green
Red     Blue      Purple
Orange  Green     Blue
Purple  Yellow    Orange
Red     Blue      Yellow
SEE THE NETWORK!

Our social identity is determined by the overlap of the many different communities within which we interact. The purpose of this activity is to draw pictures of our social selves.

You'll need:
Paper (a few sheets per student)
Colored Pencils, Crayons, or Markers

Background:
A sociogram is a picture of a person's social network. The circles represent people. The lines represent links or connections between them. People who have few lines are called “isolates.” People who have many lines are called “stars.” Sometimes, people call sociograms “friendship charts,” although they don’t always have to show friendships.

Directions:
This is a simple hands-on exercise designed to help us think about how we interact as social beings.

Think of a group of people who spend a lot of time together, like your class at school. Draw a circle to represent yourself. Then, start adding people to your sociogram. Use different colors, if it helps.

For example, you might decide to make all boys blue and all girls red. Or, maybe all people who like sports green and those who don’t orange. Start drawing lines between people who are connected. Think of other ways to connect each circle with lines to represent the many things you have in common. Keep going until you run out of ideas. You may need to stop and start over if you get stumped along the way.

Hint: You need to think about the lines before you add circles. Don’t just start by drawing a bunch of circles and then attempting to connect them. Start with your own circle and then think of the first connection you want to make—perhaps your best friend, your neighbor, your teammate. Remember: you’re not just drawing a picture of the people. You are trying to show a picture of the group and how it interacts. The lines are more important than the circles when you’re drawing a sociogram.

After you try drawing a sociogram for your class at school, try drawing one for your family, a club, or your neighborhood. Try drawing one for a fictional group of people—like the characters on a favorite TV show or in a novel. What would Harry Potter’s sociogram look like? How about Luke Skywalker?
SEE THE NETWORK!

Create your sociogram below.
RECOMMENDED READING

ELEMENTARY SCHOOL

Dr. Frankenstein's Human Body Book by Richard Walker ISBN 0756640911
Eyes and Ears by Seymour Simon ISBN 0060733020
My Bodyworks by Jane Schoenberg ISBN 1566565839
The Brain by Seymour Simon ISBN 0060877197

MIDDLE SCHOOL

Decoding Life: Unraveling the Mysteries of the Genome by Ron Fridell ISBN 0822511967
Genetics: From DNA to Designer Dogs by Kathleen Simpson ISBN 1426303610
The Complete Human Body by Alice Roberts ISBN 075666733X

HIGH SCHOOL

Double Helix: The Quest to Uncover the Structure of DNA by Glen Phelan ISBN 0792255410
The Human Brain Book by Rita Carter ISBN 0756654416
The Human Story: Our Evolution from Prehistoric Ancestors to Today by Christopher Sloan ISBN 0792263251
BENCHMARKS FOR SCIENCE LITERACY

NEXT GENERATION SCIENCE STANDARDS
K: Interdependent Relationships in Ecosystems
2: Interdependent Relationships in Ecosystems
3: Interdependent Relationships in Ecosystems
3: Inheritance & Variation of Traits

MS: Interdependent Relationships in Ecosystems
MS: Growth, Development, & Reproduction of Organisms

HS: Interdependent Relationships in Ecosystems
HS: Inheritance & Variation of Traits

NATIONAL SCIENCE EDUCATION STANDARDS
K-4 C: Life Science
5-8 C: Life Science
9-12 C: Life Science

COMMON CORE ENGLISH LANGUAGE ARTS
K-5: Reading Informational Text
6-12: Literacy in Science & Technical Subjects

COMMON CORE MATHEMATICS
K-12: Measurement & Data

CURRICULUM STANDARDS FOR SOCIAL STUDIES
Early Grades: Theme IV – Individual Development & Identity
Early Grades: Theme V – Individuals, Groups, & Institutions

Middle Grades: Theme I – Culture
Middle Grades: Theme IV – Individual Development & Identity
Middle Grades: Theme V – Individuals, Groups, & Institutions

High School: Theme IV – Individual Development & Identity
High School: Theme V – Individuals, Groups, & Institutions
I like making new friends...
I'm reserved... I keep my room neat...
I'm good under pressure...
I argue a lot...
I finish what I start...
I am a bit of a rebel...
I love exploring new places...
What kind of person am I?
I like making new friends...
I'm a little reserved... I keep my room neat...
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