



## STEAM Challenge

### Digital Storytelling Unit

#### *Chemical Dating Game – Game Show*

Designed for Middle and High School Students

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# Introduction

This Digital Story Telling Challenge will take two to four weeks to complete. This Challenge targets key Human Life Skills – creativity, collaboration, critical thinking, digital literacy, and presentational skills – in equal measure with the curricular content. Delivering on all those learning goals requires student immersion and time. The results, as based on our research, are a high level of student engagement, deep learning, and 100% teacher endorsement.

The following Challenge:

- Should be completed by collaborative teams of two to four students but can be completed independently, if desired.
- Is aligned to nationally recognized Curricular Standards.
- Contains an Evaluation Rubric that allows the teacher to clearly score and appraise the students' work.
- Is designed to be integrated into the classroom in alignment with existing curricula.
- Can be assigned as an extra credit project to teams of students that you think would benefit from this kind of immersive, deep learning experience. Additionally, will work well in informal educational settings.
- Should follow the rules of Digital Citizenry in their proper usage and/or citation of images, music and text taken from other sources. See the Digital Rules area in the free Media Resources section of the Meridian Stories site for guidance.

The [Media Resources](#) section also contains many other **free support materials** from short videos featuring professionals in the field – Artists and Innovators– to short written documents that cover everything from storyboarding to creative brainstorming, interviewing techniques to game design.

While it is helpful to have a Technology Integrator involved, they are not usually necessary: the students already know how to produce the media. *The teacher's primary function in these Challenges is to guide the students as they engage with the content. You don't need to know editing, sound design, shooting or storyboarding: you just need to know your content area.*

At the end of the Challenge, it is often fun and useful to have a screening of all the media productions – they are all designed to run under 4 minutes each. Students can vote for their favorite videos that can then be screened in a larger assembly-like setting for the whole grade to see. Or this work can be presented as part of a student showcase for parents and friends. Presentational Skills is another Human Life Skill that this project enables.

Our research indicates this to be a really useful exercise for two additional reasons:

1. Students actually learn from their peers' presentations – it is useful to hear a perspective that is not just the teacher's; and
2. The public setting – painful as it is for some students – provides them with an opportunity to 'own' their work and to be more accountable.

Finally, if you are interested to learn more about the community of schools who annually participate in the [Meridian Stories Competitions](#) – a community that is characterized by a friendly competitive spirit; feedback from Mentors on each submission; and the rewarding of digital badges in content, storytelling and digital literacy – please return to the Competitions section of the website or inquire at [info@meridianstories.com](mailto:info@meridianstories.com).

**Let's get started.**

## The Challenge

*The Dating Game* was a classic TV series pairing 'bachelors' and 'bachelorettes' that ran from the mid-60s through the 1990s. In that TV series, one bachelor (or bachelorette) is separated by a wall from three potential dates. The bachelor asks a short series of questions to the three potential dates. After listening to the answers, and based only on this information, the bachelor chooses who their date will be: Bachelorette #1, Bachelorette #2 or Bachelorette #3. For a more complete explanation/description, search The Dating Game on YouTube.

Now, you have a chance to re-create this television format, pairing ...periodic elements. That's right: choose an element to be the subject of the show, then three

elements as contestants for ‘a date’. One must be clearly the most compatible, and one must be clearly incompatible. The other? Up to you.

Deliverables include:

- Game Show Video
- Summary Paper (at teacher’s discretion)
- Shooting Script (at teacher’s discretion)

## The Process

Below is a suggested breakdown for the students’ work.

**During Phase I, student teams will:**

- Pick an element from the Periodic Table of Elements to be the subject.
  - Research the properties of this element. What chemical phase is it in – solid, liquid, or gas? Is it reactive? What electron state is it most likely to be in? What does that make it most likely to bond with? More properties to consider: density, melting point, boiling point, solubility, flammability, and odor.
- Pick three ‘element contestants’.
  - You should pick them with the game show subject in mind, because they must have varying levels of compatibility with the subject.
  - \* High school teams must include at least one substance in the contestants that is not a single element – e.g. NaCl (sodium chloride, or table salt) or H<sub>2</sub>O (water).
    - What determines if an element is ‘compatible’ with a substance or solution? If it does not precipitate out at room temperature? If it undergoes a chemical reaction? You decide!
  - What sort of questions might help you determine compatibility? Are there any ions? Which element is your contestant most likely to bond with?
  - Research the properties of these substances.
- Pick questions that the element will “ask” the contestants.
  - Each element needs to answer two questions... They can be the same or different. There should be a maximum of 4 different questions.
  - Answers to these questions should illuminate the compatibility of the subjects, so the answers should be chemically relevant. But please be creative with the questions and the answers!

- **Teacher's Option:** Summary Paper – Teachers may require that teams hand in a paper outlining their element choices, rationale and proposed interview questions and answers.
- Decide how to represent the subject element and contestants on the game show.
  - What does a talking element look like to your team?
    - People, props, puppets?
    - Gender? Costume? Voice? Attitude? Tone?

**During Phase II, student teams will:**

- Brainstorm about the game show genre's use of humor, music, look, pacing, etc. Make decisions about how serious or light-hearted/playful you want to be. Looking at several episodes of *The Dating Game* can help with this discussion.
- Write and finalize the script.
  - **Teacher's Option:** Shooting Script – Teachers may require that teams hand in their Shooting Script.
- Cast the video (if necessary).
- Pre-produce the scene:
  - Scout locations for shooting (if this is being shot on location);
  - Create costumes, props and other set pieces, as needed;
  - Prepare the logistics for the actual shooting of the scene; and
  - Rehearse the scene.

**During Phase III, student teams will:**

- Shoot the video.
- Edit the video, adding stills and graphics as desired.
- Post-produce the video, adding music and sound effects as desired.

## Meridian Support Resources

*Meridian Stories* provides two forms of support for the student teams.

1. Media Innovators and Artists – This is a series of three-to-four-minute videos featuring artists and innovative professionals who offer important advice, specifically for Meridian Stories, in the areas of creativity and production.
2. Meridian Resources – These are short documents that offer student teams key tips in the areas of creativity and production.

Recommended review, as a team, for this Challenge include:

**Media Innovators and Artists**

**Meridian Resources**

<p><i>On Directing Comedy</i> – Davis Robinson</p> <p><i>On Acting</i> – Abbie Killeen</p> <p><i>On Editing</i> – Tom Pierce</p> <p><i>On Character Design</i> – Scott Nash</p>	<p>“Creative Brainstorming Techniques”</p> <p>“Producing: Tips for the Shoot”</p> <p>“Producing: Time Management”</p> <p>“Three Free Rendering and Animation Programs: Scratch, Geogebra And Sketch Up”</p>
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## Evaluation Rubric – *Chemical Dating Game Show*

<b>CONTENT COMMAND</b>			
<b>Criteria</b>	<b>1-3</b>	<b>4-7</b>	<b>8-10</b>
<b>Correct Answers</b>	The correct answers are either inaccurate or not clearly communicated. It is unclear that the students understand elements and their interactions	The correct answers are accurate, but not presented fully. The students seem to have a basic understanding of elements and their interactions	The correct answers are accurate and presented fully. The students have a clear understanding of elements and their interactions
<b>Question Development</b>	The questions posed by the subject element do not clearly relate to elements and their interactions	The questions posed by the subject element are related to elements and their interactions, but don't add to our understanding of the topic	The questions posed by the subject element are directly related to elements and their interactions, and add to our understanding of the topic
<b>Question Answers</b>	The answers of the element contestants do not reflect understanding of their periodic properties and how they would interact with the subject	The answers of the element contestants seem to be reasonably plausible	The answers of the element contestants are plausible, engaging and thought provoking
<b>STORYTELLING COMMAND</b>			
<b>Criteria</b>	<b>1-3</b>	<b>4-7</b>	<b>8-10</b>
<b>Character</b>	The presentation of the elements is not	The presentation of the elements serves	The presentation of the elements is

	particularly engaging or suitable	the game show effectively	engaging and entertaining
<b>Tone/Mood</b>	The tone and/or mood of the game show is unclear or detracts from the overall engagement with the game show	The tone and/or mood are interesting choices that at times enhance our engagement with the video	The tone and/or mood are well chosen and enhance our engagement with the video
<b>MEDIA COMMAND</b>			
<b>Criteria</b>	<b>1-3</b>	<b>4-7</b>	<b>8-10</b>
<b>Directing/Acting</b>	The directing and acting lack coherence and discipline	The directing and acting are solid, but inconsistently engaging	The directing is clear and coherent and the acting is convincing and believable
<b>Setting/Format</b>	The setting and creative approach to the game show don't enhance our understanding and enjoyment	The setting and creative approach to the game show are interesting choices, but inconsistently engaging	The setting and creative approach enhance our enjoyment and understanding of the game show
<b>Editing/Music/Sound</b>	The game show feels patched together and the overall editing and use of music/sound detracts from the game show	The game show flows, but there are occasional editing/sound/musical distractions	The game show is edited cleanly and effectively, and the addition of music and/or sound enhance our enjoyment
<b>HUMAN SKILLS COMMAND</b>			
<b>Criteria</b>	<b>1-3</b>	<b>4-7</b>	<b>8-10</b>
<b>Collaborative Thinking</b>	The group did not work together effectively and/or did not share the work equally	The group worked together effectively and had no major issues	The group demonstrated flexibility in making compromises and valued the contributions of each group member
<b>Creativity and Innovation</b>	The group did not make a solid effort to create anything new or innovative	The group was able to brainstorm new and inventive ideas, but was inconsistent in	The group brainstormed many inventive ideas and was

		their evaluation and implementation of those ideas	able to evaluate, refine and implement them effectively
<b>Initiative and Self-Direction</b>	The group was unable to set attainable goals, work independently and manage their time effectively	The group required some additional help, but was able to complete the project on time with few problems	The group set attainable goals, worked independently and managed their time effectively, demonstrating a disciplined commitment to the project

## Essential Questions

1. What are the intrinsic properties of a select range of elements in the periodic table and how can they be used to identify elements?
2. How can the periodic table be used to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms?
  - a. How can you conceptualize and model the atomic composition of simple molecules (and, for high school students, extended structures), and how does that help you determine how molecules will interact?
3. What are the challenges of creating an educational as well as an entertaining video program?
  - a. How has incorporating scientific research into the production of a video that is designed to entertain changed and deepened your understanding of the science?
4. How has working on a team – practicing one’s collaborative skills - changed the learning experience?

## Student Proficiencies

1. The student will learn that the periodic table consists of elements, each of which has intrinsic properties regarding things like toxicity, flammability, stability, and more.

2. The student will gain a deeper understanding of how the periodic table is organized to reflect the physical and chemical properties of elements, including but not limited to reactivity of metals, types of bonds formed, number of bonds formed, and relative ionization energy.
  - a. The student will become more familiar with the concept of valence shells of electrons and how they dictate molecular interactions.
3. The student will have explored the often conflicting dynamic between education and entertainment, and the spaces where the two can co-exist.
  - a. The student will understand more about the science content by reframing it in order to approach it through a media production process designed to entertain the audience.
4. The student will have an increased awareness of the challenges and rewards of team collaboration. Collaboration – the ability to work with others - is considered one of the most important 21<sup>st</sup> century skills to develop in students as they prepare for life after secondary school.

## NGSS Curricular Correlations

The *Chemical Dating Game Show* Challenge addresses a range of curricular objectives that have been articulated by the **Next Generation Science Standards**.

Below please find the standards that are addressed, either wholly or in part.

### Next Generation Science Standards (NGSS)

#### High School – Structure and Properties of Matter

Students who demonstrate understanding can:

- Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms (HS-PS1-1)

#### Disciplinary Core Ideas:

- Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (PS1.A HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (PS1.A HS-PS1-1)

- The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (PS1.A HS-PS1-3)
- Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (PS2.B HS-PS1-1, HS-PS1-3, HSPS2-6)

## Middle School – Structure and Properties of Matter

Students who demonstrate understanding can:

- Develop models to describe the atomic composition of simple molecules and extended structures. (MS-PS1-1)

### Disciplinary Core Ideas:

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3)
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4)
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)