



STEAM Challenge Digital Storytelling Unit

GMO Commercial: Where Do You Stand?

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.*

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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.

Let's get started.

The Challenge

Genetically Modified Organisms – GMOs – are experimental plants or animals that have been genetically engineered by humans in a lab using DNA from other plants and animals, as well as bacteria and viruses.

GMOs have strong proponents. They tout higher crop and livestock yields; better tasting, more nutritional food; drought and pest resistant crops; and the ability to farm on marginal land for food production. In fact, in July of 2021, the headline story in the The New York Times Magazine was titled, 'Learning to Love GMOs' with the subheading reading as such: "Overblown fears have turned the public against them. But the potential benefits have never been greater." The article, by Jennifer Kahn, goes onto detail the history of GMOs and some of the small start-ups that are trying to change the narrative around GMOS.

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GMOs have strong opponents. They say genetically modified foods are “Frankenfood” and represent a dangerous proposition. They point out the risks of relying on a food system that has potential for unforeseen impacts to ecological and human health, and cite heightened allergies, potential risk of abnormal tumor growth and even death among the tradeoffs. They also warn of becoming over-reliant on a few specialized products, compared to a more diverse, nutritionally complex food system.

GMO ingredients are found in 80 percent of packaged food in the US, yet most people are not aware of it because the US and Canada do not require labeling that identify food as genetically engineered. Is this morally defensible?

Conversely, currently there are 64 countries, including the European Union, Australia, and Japan, that do require labeling, with some – nineteen countries as of 2015 – mandating outright bans on GMOs because they are not convinced of their safety. Is it morally defensible to discount GMOs’ potential for feeding a hungry world already strapped for resources?

In this challenge, you will answer “Yes!” to one side of this debate by making a TV commercial for or against a GMO product. Whether you choose the GMO-pro or -con side is entirely up to you, but your job now is to be convincing. Here is how it will work.

Research a GMO product that is commercially available today. For your Pro-GMO argument, make a 120-second commercial for the GMO product, as if the biogenetics company that makes the product sponsored it.

For your Anti-GMO argument against the product, a fictitious anti-GMO group sponsors your 120-second commercial – a consumer rights group, or organic farmers, for example. Identify your organization’s mission, and why it opposes the GMO product: what problems do you see it causing? These types of ads frequently end with some form of call to action. What action is your commercial trying to elicit?

In both cases, your commercial must a) communicate clearly what a GMO is; b) communicate clearly the biotechnology methods; and c) articulate the possible benefits and possible risks of the GMO product.

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Your target audience is a group of 25 adults. They have been brought in to participate in a public opinion study about GMOs. They have never heard of GMOs, so they know nothing about them. For the study, this group will screen both the pro-GMO and anti-GMO commercials after which they will be asked whether or not they like the product. *This is the decision you are trying to influence with your video.*

AND, there is one more requirement, regardless of which side you choose, pro or con: your commercial must give your selected GMO product *its own voice*. That's right: include a talking, non-human representation of your product! Think *Sesame Street* and their talking vegetable puppets. Or think of a product that is represented by a mascot...that is like the product! For example, the Pillsbury Doughboy or the Michelin Tire Man. The role of this character in your commercial can be large or small, from a cameo still shot to the lead role. But the character needs to be there.

Deliverables include:

- GMO Commercial
- Summary Chart of Pros and Cons (at teacher's discretion)
- First Draft Script (at teacher's discretion)
- Shooting Script (at teacher's discretion)

Process

Below is a suggested breakdown for the students' work.

During Phase I, student teams will:

- Research what Genetically Modified Organisms are and how they a) have been used in the past, both successfully and with **adverse effect**; and b) how they are being studied and marketed in the present.
- Choose one example of a GMO that your team finds particularly promising and relevant, or menacing and relevant.
- How is the GMO made? What are the original plants and/or animals? How are they modified? Explore the biotechnology methods that transfer the science into a real-world product.
- Detail the **real-world** applications and benefits of your GMO. What is the problem that is being solved? For teams taking the anti-GMO perspective,

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research the possible negative implications of your GMO and be able to predict and present the possible risks.

- ***Teacher's Option: Summary Chart of Pros and Cons*** – Teachers may require that teams hand in a summary chart of their select product, detailing its beneficial functions in one column and the potential negative ramifications in the other, while keeping track of the resources that the team is using to support their arguments.
- Brainstorm how you want to visually represent your GMO product in your video. In addition to your script, what photos, video, graphs and other materials will you need to define the benefits and pitfalls of your product? In what way can you give your GMO product a voice?
 - Teams may use up to 20 seconds of pre-existing footage in their commercials. Be sure to understand the rules that govern the incorporation of pre-existing footage.

During Phase II, student teams will:

- Brainstorm about the key ideas that you want to include in your Pro or Con commercial. Here are some questions and ideas to consider:
 - What is the most persuasive and potent reason supporting the position that your team has agreed upon regarding your GMO product? How will you best maximize that argument? At the beginning, or as a climactic ending? Remember, in this challenge your goal is to be persuasive.
 - What are your two or three chief “selling points”? These points could become the foundation of your video.
 - Anticipate the arguments from the opposing side and how you can address those in your commercial.
 - Who, in addition to the character requirement above, are the voices/characters that you want to include? Scientists? Possible consumers? Consumer advocates? Sales people? Will there be interviews?
 - What mood will your commercial take – serious and ominous? Light and promising?
 - Your target audience does not understand GMO science. What do you think is most important for them to understand? How can you target your commercials to interest, engage, and persuade them? How can you visualize the process of creating a GMO in a succinct, understandable way?

- To help with this process, we recommend that your team watch TV commercials, with a critical eye. In particular, scrutinize political ads sponsored by interest and advocacy groups pushing their candidates or agendas (you can find oodles of them online). Notice what works and what doesn't work. What ideas can you adapt to your own commercials?
 - Another place to look: [The Ad Council](#), which is responsible for many of the national Public Service Announcements that you see on TV. PSAs are generally designed to change people's attitudes about an issue. That is what you are attempting to do as well: not change so much as form an attitude. The strategies found on the Ad Council site can be super helpful. Screen and take notes: what is working and what isn't? Then adapt those strategies for your commercial.
- Your team should now have identified a) a GMO product that has a defined market niche; b) the key scientific points that need to be communicated; c) the key arguments that you will make to support your position; and d) a handful of creative ideas from your brainstorm above about how to visualize and verbalize those arguments for your commercial. Now, create a script outline.
- Draft the script.
 - ***Teacher's Option: First Draft Script*** – Teachers may require that teams hand in a first draft script for feedback and review.
- Discuss and map out with your team what imagery you need to tell your story. Oftentimes a storyboard is the best process for this (information about storyboarding can be found in the Meridian Support Resources below).
- Pre-produce the commercial:
 - Scout locations for shooting (if this is being shot on location);
 - Contact the people that you will need to include;
 - Research, as necessary, the still images that you will integrate into your video;
 - Create costumes, props and other set pieces, as needed;
 - Prepare the logistics for the actual shooting of the video; and
 - Rehearse.

During Phase III, student teams will:

- Finalize the script
 - ***Teacher's Option: Shooting Script*** – Teachers may require that teams hand in their Shooting Script for feedback and revision.

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- Shoot the video
- Record the voice-over or narration, as necessary.
- Edit the video, adding stills and graphics as desired.
 - Post-produce the video, adding music and sound effects as desired.

Meridian Support Resources

<p><i>Meridian Stories</i> provides two forms of support for the student teams:</p> <ol style="list-style-type: none"> 1. <u>Media Innovators and Artists</u> – 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. <u>Meridian Resources</u> – These are short documents that offer student teams key tips in the areas of creativity and production. <p>Recommended review, as a team, for this Challenge include:</p>	
Media Innovators and Artists	Meridian Resources
<p>On Documentary Films – Sarah Childress</p> <p>On Film Producing – Tom Pierce</p> <p><i>On Non-fiction</i> – Margaret Heffernan</p> <p><i>On Editing</i> – Tom Pierce</p>	<p>“Creative Common Licenses”</p> <p>“On the Doctrine of Fair Use”</p> <p>“Creating a Commercial/PSA”</p> <p>“Creating Storyboards, Framing the Shot”</p>

Evaluation Rubric – *GMOS: Where Do You Stand?*

CONTENT COMMAND	
Criteria	1 - 10
Communication of Content – GMOs	The science is clearly and creatively presented, and well explained
Communication of Content – Ramifications	The video presents thorough and creative arguments for or against the use of GMOs
Agricultural Science and Society	The video effectively demonstrates the complex dynamic between the agricultural science and societal needs
STORYTELLING COMMAND	
Criteria	1 - 10

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Script	The script clearly conveys the content in an engaging and convincing narrative, and the commercial is persuasive and engaging
Media Format	The video format captures the tone and pace of a real commercial
Character	The representation and voice of the GMO product is successful and purposeful

MEDIA COMMAND	
Criteria	1 - 10
Use of Visual Media	The use of new and existing video, stills, and graphics is engaging, visually interesting, and reinforces the commercial's message
Sound and Music	The selective use of sound effects and music enhances the video's effectiveness
Editing	The digital story is edited cleanly and effectively, resulting in an engaging viewing experience

HUMAN SKILLS COMMAND	
Criteria	1 - 10
Collaborative Thinking	The group demonstrated flexibility in making compromises and valued the contributions of each group member
Creativity and Innovation	The group brainstormed many inventive ideas and was able to evaluate, refine and implement them effectively
Initiative and Self-Direction	The group set attainable goals, worked independently and managed their time effectively, demonstrating a disciplined commitment to the project

Essential Questions

1. What is a GMO; how pervasive are GMOs in our society; and why are they relevant?
2. In what ways do society's needs intersect with science, engineering, and technology?

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- i) Genetic variations arise naturally from sexual reproduction, but also from mutations of genetic information that may occasionally result in changes to the structure and function of proteins. How is genetic engineering different?
 - ii) By imagining and elaborating on the principles of heredity and expression of traits, has your understanding of principles of how life forms adapt and change over time also changed?
3. How do scientists and engineers define and solve problems? What are the criteria and constraints of a successful solution?
4. How has incorporating scientific research into the production of a video that is intended to educate and persuade - exercising one's creativity, critical thinking and digital literacy skills - changed your understanding of the science?
5. How has working on a team – practicing one's collaborative skills - changed the learning experience?

Student Proficiencies

1. The student will be able to explain what GMOs are and why they are a vital part of the current debate around global food production.
2. The student will better understand the naturally occurring processes and forms in physical, life, and earth sciences from which society has benefited.
 - a. The student will better understand principles of heredity and genetic expression
 - b. The student will gain an appreciation for the short- and long-term consequences of technological innovation, both good and negative, on society and the environment
3. The student will gain a better understanding of the process of identifying a problem and devising a solution, including a fuller understanding of the consequences of its implementation.
4. The student will utilize key Human Skills, with a focus on creativity, critical thinking and digital literacy, to understand more about the science content by approaching it through a media production designed to educate the audience.
5. 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 Human Skills to develop in students as they prepare for life after secondary school.

Curricular Correlations

The *GMO Commercial: Where Do You Stand?* Challenge addresses a range of curricular objectives articulated in the Next Generation Science Standards. The broad nature of this challenge – the array of forms GMOs can take – means that students have an opportunity to research scientific material in the categories of Life Science and Earth and Space Sciences, and imagine their implementation through Engineering, Technology, and Applications of Science. Therefore, this challenge potentially touches on three major categories in the Next Generation Science Standards. Below are the standards that this challenge addresses, wholly or in part.

Next Generation Science Standards (NGSS)

Middle School: Life Sciences

Students who demonstrate understanding can:

- Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (MS-LS3-1)
- Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. (MS-LS3-2)

Disciplinary Core Ideas:

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)

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- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)

High School: Life Sciences

Students who demonstrate understanding can:

- Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (HS-LS3-1)
- Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. (HS-LS3-2)

Disciplinary Core Ideas:

- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (HS-LS3-1)
- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)
- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

Other Plausible Core Curricular Correlations

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The student teams may also cover the following topics:

- LS1 From Molecules to Organisms: Structures and Processes
- ETS1 Engineering Design