

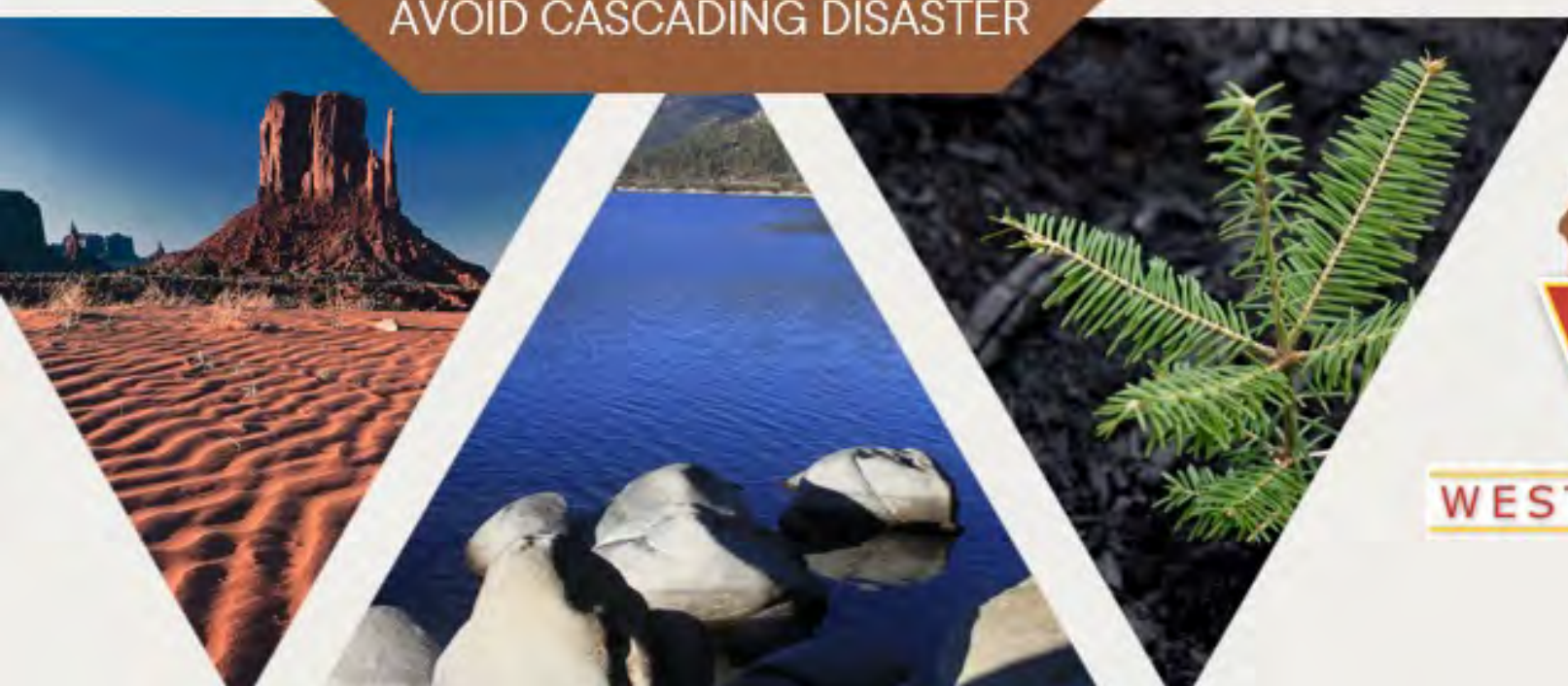


WESTERN REGIONAL PARTNERSHIP

Tribal Engagement Committee

January 31, 2025

ENHANCING RESILIENCE TO
AVOID CASCADING DISASTER



WRP

WESTERN REGIONAL PARTNERSHIP

Today's Agenda



- **Welcome and Introductions**

- **Featured Presentations:**
 - **Maximizing Revenue of Renewable Energy Through Grid Enhancing Technology** by Lee Angers
 - **Teaching Indigenous History, Culture and STEM through Games** by AnnMaria De Mars, Ph.D.

- **Next Steps and Actions**
- **Around the Phone Updates**



WRP Tribal Engagement Committee Co-Chairs



**Elveda
Martinez**

- Walker River Paiute Tribe

Will Micklin

- CEO, Ewiiapaayp Band of Kumeyaay Indians

**LeRoy N.
Shingoitewa**

- Hopi Tribal Council Representative

**Floyd W
Velasquez Sr.**

- Emergency Services Administrator,
Morongo Band of Mission Indians





Lee Angers

Project Manager
DEPCOM

- Project manager and developer of wind, solar and battery storage projects
- Currently works for an EPC company, DEPCOM. Clients are solar developers and independent power producers(IPP)
- Over a decade of experience negotiating with landowners for pipelines, renewable energy, a high-speed train & transmission lines
- Deep respect for both landowners and the land
- Lives in Santa Fe, NM for the mountains and indigenous culture

Maximizing Revenue of Renewable Energy Through Grid Enhancing Technology



1. Why am I talking to you about GETs today?

Maximize revenue (royalties), lower utility bills, reduce unnecessary t-line upgrades

2. What are GETs?

They are software, hardware or a combination that increase capacity of the electric grid (the grid)


3. What can they do for wind, solar and battery storage projects?


Drastically reduce interconnection costs, reduce curtailment & increase profits/royalty





What are GETs?

Unlocking the queue: How advanced transmission technologies can double renewable energy build

 **Grid-Enhancing Technologies (GETs):** hardware or software that increases the capacity, efficiency, and/or reliability of transmission facilities

 **Dynamic Line Ratings**
Measure the true capacity of transmission lines based on ambient conditions

 **Advanced Power Flow Control**
Reroutes power from congested to underutilized lines

 **Advanced Topology Control**
Identifies grid reconfigurations to reroute flows around bottlenecks

Grid forming batteries & inverters and advanced conductors will be added soon.

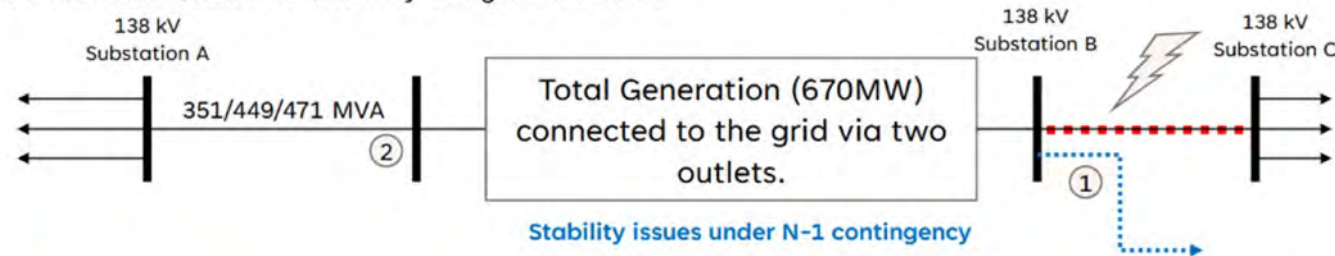
What can they do for renewables?

- Drastically reduce interconnection costs
- Reduce curtailment (due to grid capacity constraints)
- Increase profits/royalty over life of project

PRIOR GET APPLICATION



Example: Using GET to interconnect a 105 MW wind project in the ComEd PJM area - reduce the network upgrade cost from \$180M to \$20M by using Smart Valve



Root-Cause Analysis: Low SCR (Short Circuit Ratio) -> Weak system -> Vulnerable to stability issues

- Under a critical 138kV line outage, the SCMVA at 138 kV Substation A was very low, around 1.7 (SCR below 3 considered to be weak power systems).

Mitigation Plan

- ① (Option 1) PJM's mitigation plan was to build a new transmission line from Substation B (\$180M)
- ② (Option 2) Interconnection Customer proposed an alternative solution using SmartWires to reduce the critical line impedance and verified the stability problem could be resolved. (\$20M)

SMART WIRES



Alternative Solutions
(SmartWires – SmartValve 10-1800 Product)



Examples of System and Customer Benefits From Grid Enhancing Technologies

1

More affordable infrastructure:

GETs can increase the value of existing transmission infrastructure and upgrades.

DLR increase transmission capacity:

- **Massachusetts:** DLR deployment created an average increase of 47% in line capacity.
- **New York:** DLR found up to 60% more capacity.
- **Pennsylvania:** Duquesne Light Company found an average of 25% more capacity on transmission lines.
- **Midwest:** Xcel's Minnesota, Wisconsin, and Colorado territory demonstrated increased capacity available 85% of the time.

GETs save money for customers by reducing grid congestion and generator curtailment:

- **Australia:** APFC technology is expected to deliver net benefits of up to \$180 million to electricity customers by allowing an additional 170 megawatts (MW) of power to be transferred into New South Wales.
- **England:** APFC technology is estimated to save more than \$500 million by avoiding curtailment costs through an effort by National Grid Electricity Transmission to use APFC on five 275 kilovolt (kV) lines and 400 circuits.
- **Pennsylvania:** PPL Electric Utilities deployed DLR to avoid over \$20 million in annual grid congestion costs.
- **United States:** Topology optimization studies in four U.S. electricity markets (PJM, MISO, SPP and ERCOT) show reduced congestion costs by 25-50% and reduced renewables curtailment by 50%.



2

Cleaner energy through faster and cheaper generator interconnection:

GETs can lower costs and shorten timelines for new generation.

- **Faster generator interconnection:** At the system level, GETs can double the capacity for new generation on existing infrastructure, per a study of the Kansas and Oklahoma systems and interconnection queues done by the [Brattle Group](#).
- **Reduce interconnection costs:** RMI found that GETs could enable interconnection for 6 GW of renewable energy, saving around \$500 million over traditional upgrades. Anecdotally, developers report interconnection costs of \$50-400 million for 1-3% projected line overloads, which would likely be resolved by DLR at a fraction of the cost.
- **Shorten study and construction timelines:** New lines and other traditional upgrades can take years to design and deploy, while GETs can be operational within months. PJM's 2024 phase one interconnection study reported upgrade timelines longer than 3 years for many projects.

- **Serve as a bridge while projects wait for traditional upgrades:** GETs can provide additional provisional transmission service for projects awaiting traditional upgrades.
- **Decrease queue withdrawals:** High upgrade costs lead to projects dropping out of the queue, requiring restudies and increasing uncertainty around interconnection costs. By including GETs in interconnection studies, more projects should move through the queue more smoothly.

Summary:

Why am I talking to you about GETs today?

Whether you own utility scale renewables, or you are simply a utility customer or you own land where a new or amended easement for transmission is being requested, GETs can do a lot for you.

How?

Ask your utility if they've considered GETs for reliability, increased capacity, efficiency and safety

Ask your renewable developer if they have analyzed GETs for the cost to interconnect and for reduced curtailment over the life of the project

Q&A

Thank you!





AnnMaria De Mars, Ph.D.

President
7 Generation Games



- **President of 7 Generation Games**
- **Educator:**
 - Taught math at all grade levels from 5th grade through doctoral students and at public, private and tribal colleges
 - Co-Principal Director of the Growing Math project, providing curriculum to teach Indigenous history, mathematics and agricultural science
- **Developer:**
 - Lead developer on 14 educational games, including Making Camp Lakota, Making Camp Ojibwe and Spirit Lake: The Game.
- Ph.D., Applied Statistics, Tests and Measurement, University of California, Riverside. MBA, University of Minnesota. BSBS, Business, Washington University.
- First American to win a gold medal at the World Judo Championships

Teaching Indigenous History, Culture and STEM through Games

AnnMaria De Mars, Ph.D., 7 Generation Games





Telling the untold stories

There has always everywhere been math

AI and tech changes impacting games

“Our language will not survive unless our children use it while they are playing”

“It’s not only Lakota children who need to learn Lakota history”

“We are still here.”

TPS **TEACHING WITH
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U.S. National
Science
Foundation



USDA



7generationgames.com



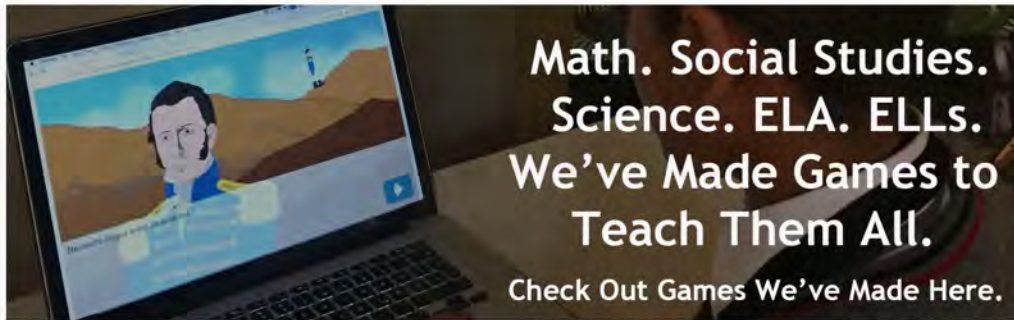
Games That Make You Smarter

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We Make Educational Games and the Tools to Develop Them

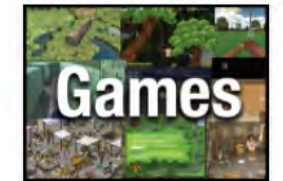
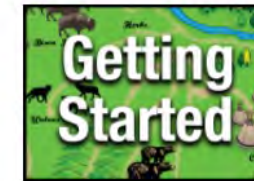


SIGN UP

7 GEN BLOCKS
A Platform to Make Educational Games
Transform your content into an interactive game.
Sign up here to join our beta list.

growingmath.org

LESSONS DATA GAMES RESOURCE LIBRARY FAQ CONTACT TRAINING



Update:

Co-designing games to teach
Indigenous and rural history

TPS TEACHING WITH
PRIMARY SOURCES
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How it works



Each cohort meets online and (optionally) in person and decides on a game topic



We work with the cohort to create a game design



7 Generation Games develops the games



Teachers create cross-curricular lesson plans that include the game and STEM

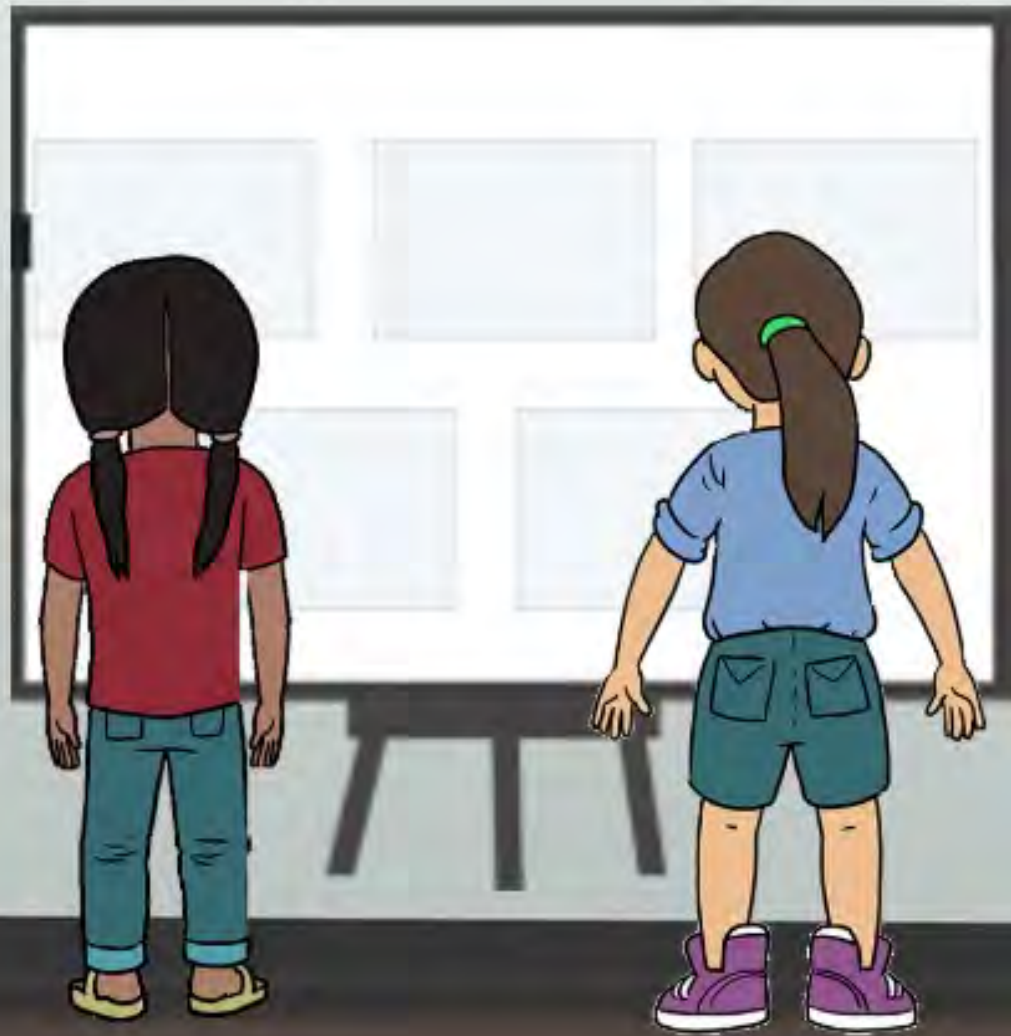


Everything is aligned with math or ELA standards and, if appropriate, OSEU, NDNAE or Diné standards

Cohort 1:
Native American veterans
1900 to present

https://sandbox.7generationgames.com/warrior_vets/





There are five choices – world war I, women veterans, war stories, famous veterans and I can't read the tiny letters on that last one.





Cohort 2: Lewis & Clark expedition from multiple perspectives

Agronomic Performance and Nitrogen Fixation of Heirloom and Conventional Dry Bean Varieties Under Low-Nitrogen Field Conditions -- 2019

Heirloom genotypes represent a useful source of genetics to improve symbiotic nitrogen fixation in modern bean breeding.

Agricultural science



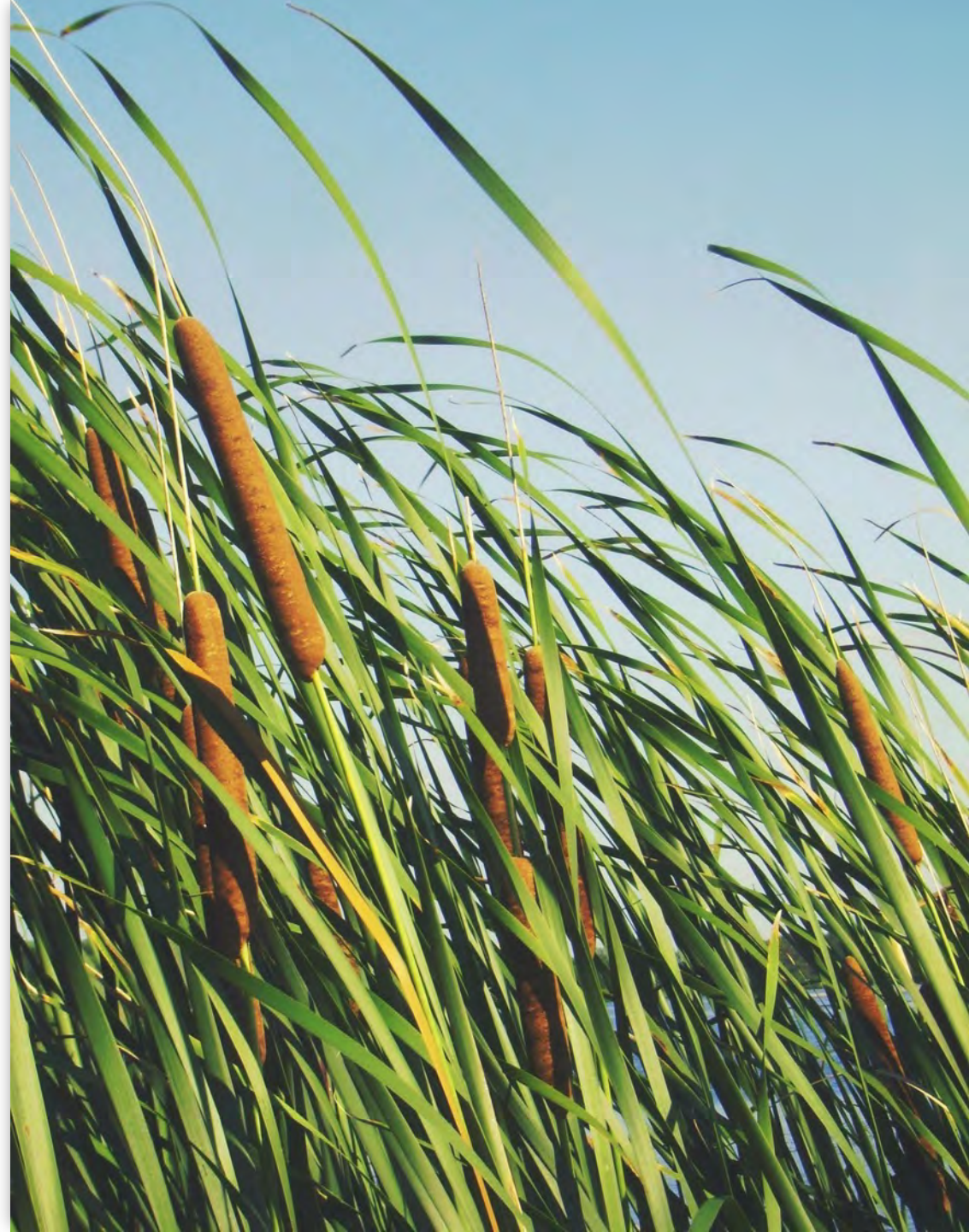
Three sisters method, growing plants that were complementary together. The corn provides a structure for the beans to climb. The beans support the corn and increase the availability of nitrogen, and the squash shades the ground – deterring weeds and maintaining soil moisture.

A large, light-colored downward-pointing arrow is positioned between the two text boxes, indicating a flow of information from the general description of the Three Sisters method to the specific application of heirloom genetics in modern bean breeding.

Heirloom genotypes represent a useful source of genetics to improve symbiotic nitrogen fixation in modern bean breeding.

Botany/ Indigenous uses of medicinal plants

The increase in tensile strength indicates a promotion of collagen fibers and a firm knitting of the disrupted wound surfaces by collagen. *Typha elephantina* possesses a potent wound healing activity, which may be due to an underlying antioxidant mechanism.



Perspectives on STEM



Lewis & Clark – The biological collecting and recording that was done added to the scientific knowledge of the flora and fauna

Mandan woman character – Agricultural science applied in planting – beans provide nitrogen, which benefits corn growth

Dakota woman – use of medicinal plants

Lakota man – mathematics of organizing the buffalo hunt

Educators & interested community members

Attend online training, either in-person or virtual

Can attend synchronous or asynchronous

In-person training April 26 (before Minot State pow-wow). Lodging provided plus up to \$200 mileage reimbursement

Graduate credit requires submission of a lesson plan to accompany game

Get more information & sign-up here

<https://www.growingmath.org/cohort-2/>

You can still join this cohort. Watch first session recording and join online on February 21st, 6-8 pm Central Time

The Problem

- 574 federally-recognized tribes
- ~ 100 state-recognized tribes
- First Nations
- Endangered languages that could be told in games and videos (children use the language while they are playing)



A vibrant, stylized illustration of a pink house with a red roof and a swimming pool. In the foreground, a pink axolotl is visible. The scene is set in a lush, green landscape with a wooden fence and rolling hills in the background. The lighting is bright and warm, suggesting a sunny day.

Untold Stories

... and why I'm showing you a picture of an axolotl

How to make
games when
it's not
profitable?



The solution

Co-design games with
educators

Enable junior developers
to make games

Create a platform where
anyone can make games

<https://www.growingmath.org/cohort-2/>



Co-design games
with educators

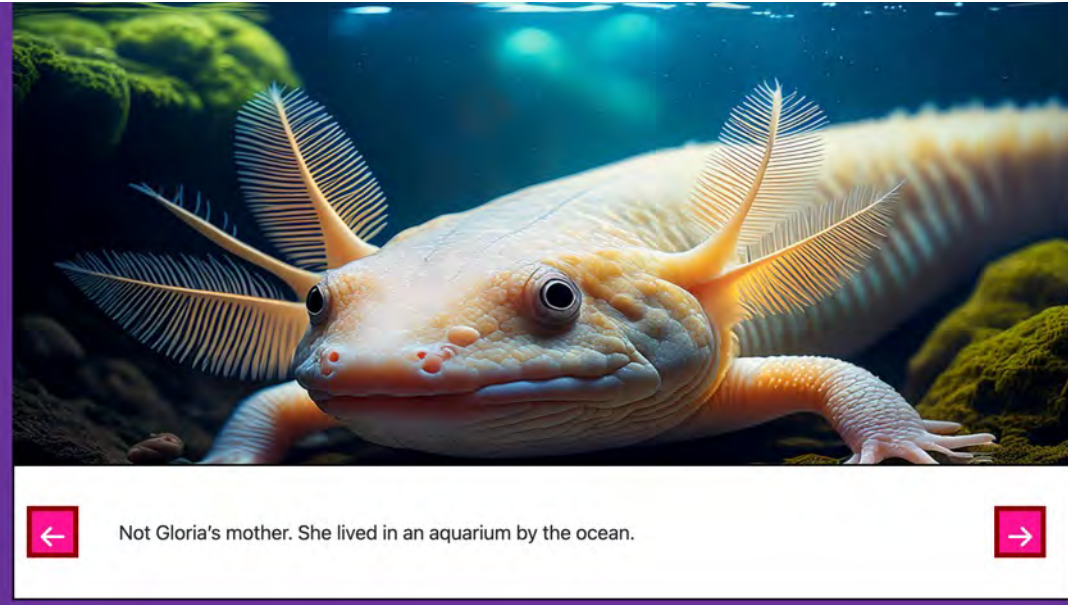
TPS TEACHING WITH
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Make coding easier

```
const options = {
  autoPlayAudioOnNewScreen: true,
  completionURL: "../maze/maze_game.html", // URL to proceed to after the
last screen
  title: "Meet Gloria", // If this is present, a title page is show with this text.
  titleImage: "images/aquarium.jpg", // Background image for title
  hasBackButton: true,
};
```

```
const screens = [
  // SCREEN 1
  {
    txt1: "Most axolotls live in Lake Xochimilco in Mexico City.",
    audio1: "audio/loria1.mp3",
    bg_img: "images/lake.jpg",
  },
];
```

https://sandbox.7generationgames.com/glorias_weekend/



<https://www.7generationgames.com/follow-the-bubbles/>



What would you do if you had twice as much time?

Four possibilities

1. Spend more time on researching content: We developed a game about [Native American veterans from World War I to the present](#) using primary sources from the Library of Congress. Did I know anything about this topic when we started, beyond "code talkers"? No, I did **not**.

2. Make a short game in a day or two to address a current topic , like [this one about the poll tests that were used to prevent African-Americans from voting.](#)

Four possibilities



Make bigger, better games within the same budget – better artwork, bilingual, more content



Make games for smaller markets - When an experienced developer takes six months to a year to code a basic game, not to mention the need for artwork, it's simply not cost-effective to make a game for students learning an Indigenous language or [studying Minnesota wildlife](#) or [who are interested in baking shows and happen to speak Spanish](#).



AI can greatly decrease art costs ... **HOWEVER**

AI doesn't do Indigenous characters well



Help

Gamecraft Math

Game site name and block names can be up to 64 characters and should be all lower case, no spaces. Use a hyphen (-) instead of a space. If you don't follow these directions, your names will be converted to all lower case and no spaces.

CREATE GAME for new game. **LOAD GAME** for previously saved game. **UPLOAD GAME** to server to write to web.

Game Site Name

?

Create Game

Load Game

Upload Game to Server

Ne You have created a new game site named "taylor-the-baker7." You may now create new game blocks for your game.

Create New Game Block

OK

Game Blocks

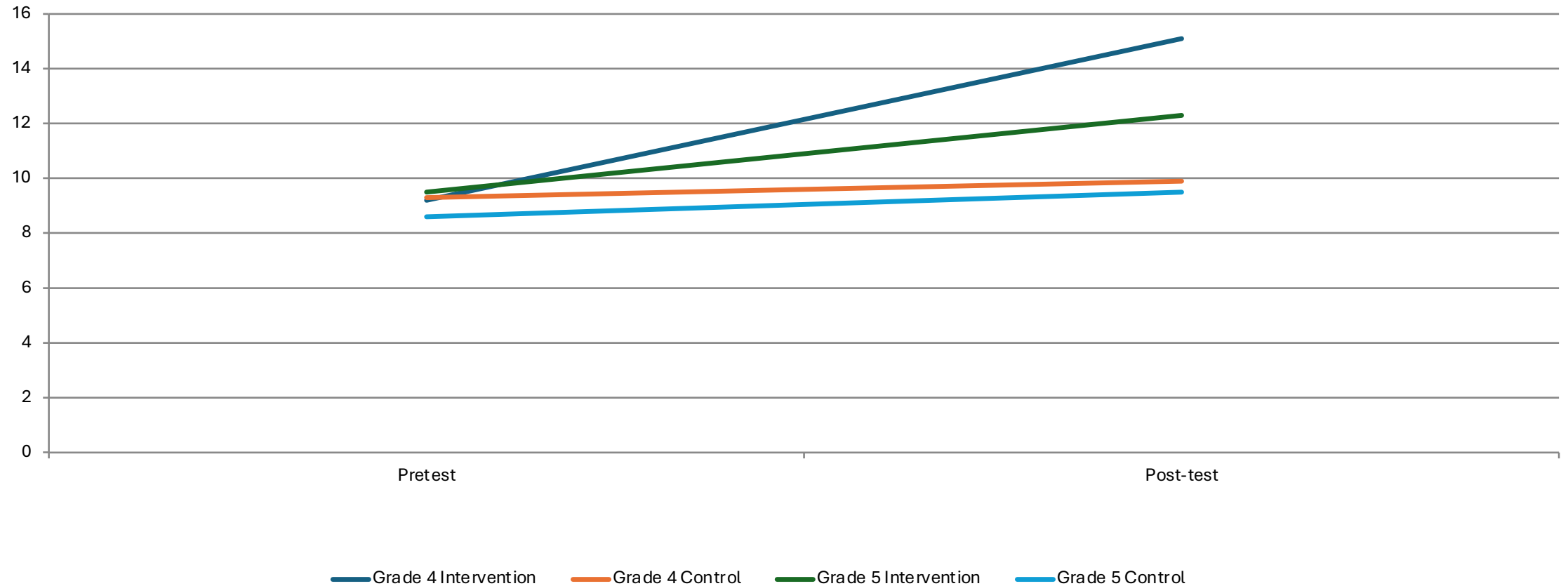
Name:
Type:

Edit Game Block

Block Page URL

When block is selected from list above, URL will appear here. To share online, give players URL of first block in the game.

Students who played Spirit Lake improved significantly more than the control group



Contacts and info:

annmaria@7generationgames.com

<https://www.growingmath.org/>

Game Design cohort - <https://www.growingmath.org/cohort-2/>

7generationgames.com

<https://7genblocks.com/> - game builder blocks

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- Emergency Services Administrator,
Morongo Band of Mission Indians





WRP TEC Next Steps

Roll up of Action Items



- **Please sign up for a WRP account – wrpinfo.org**
 - Invite/Encourage other Tribal members/liaisons to be part of TEC
- **Please provide input on Tribal Leadership Excel document**
- **Interest in being part of a WRP Deep-Dive:**
 - Water Security/resilience
 - Wildland Fire (response/ prevention)
 - Aviation/ Airspace Needs
- **Please indicate if you:**
 - Are interested in being part of the Outreach Subcommittee
 - Have recommendations on future agenda topics
 - Have additional resources like a study/funding for the good of the team



WRP 2025 Calls



Feb 28	<ul style="list-style-type: none">▪ Overview of U.S. Department of Energy's (DOE) Office of Community Engagement (OCE) by Peter Olivares, Community Clean Energy Deployment Fellow (ORISE), Rural & Tribal Engagement, Office of Community Engagement, U.S. Department of Energy▪ Overview of the USGS 3D Elevation Program by Cindy Thatcher, Geographer, U.S. Geological Survey (USGS) National Geospatial Program
March 28	<ul style="list-style-type: none">▪ FAA's drone requirements/regulations and how it might impact Tribes/tribal sovereignty by UAS Integration Office and UAS Integration Office▪ The Critical minerals mapping across the United States under the USGS Earth Mapping Resources Initiative (Earth MRI) by Jamey Jones
April 25	<ul style="list-style-type: none">▪ Presentation about the STATEMAP program by USGS
May 30	<ul style="list-style-type: none">▪ Back brief on 2025 WRP Principals' Meeting
June 27	
August 29	
Sept 26	<ul style="list-style-type: none">▪ Vacate/reschedule or keep as scheduled?



Around The Phone



Thank you!

