

Lesson Plan Title: Is this School Ready

Topic: Earth Changes

Teacher Name: eMINTS National Center staff

Teacher Grade: 4th

Teacher School: Example Teacher School

Teacher District: Example Teacher District

Standards (Performance, Knowledge and NETS-S):

Performance Standards

Gather/Analyze/Apply Information and Ideas

- 1.1 Develop questions and ideas to initiate and refine research.
- 1.2 Conduct research to answer questions and evaluate information and ideas.
- 1.4 Use technology tools and other resources to locate, select, and organize information.
- 1.8 Organize data, information, and ideas into useful forms for analysis or presentation.

Communicate Effectively Within and Beyond the Classroom

- 2.1 Plan and make plan and make written, oral and visual presentations for a variety of purposes and audiences.
- 2.3 Exchange information, questions, and ideas while recognizing the perspectives of others.

Problem Solving

- 3.1 Identify, understand, and solve problems related to how the earth changes.

Societal Responsibility

- 4.5 Develop plan of action to accomplish goals.
- 4.6 Complete cooperative tasks.

Knowledge Standards

Science

- SC5 The surface of the earth changes slowly (e.g. erosion, weathering) and quickly (e.g. earthquakes, floods, rock/mud slides, volcanic activity).

Communication Arts

- CA3 Read and evaluate nonfiction works and materials.
- CA4 Write formally and informally.
- CA6 Participate in formal and informal presentations and discussions of issues and ideas.

NETS-S

2. Communication and Collaboration

- b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats.

4. Critical Thinking, Problem Solving, and Decision Making

- c. Collect and analyze data to identify solutions and/or make informed decisions.

6. Technology Operations and Concepts

- b. Select and use applications effectively and productively.

What concepts do you want students to understand after completing this lesson?

- Changes to the earth’s surface may occur quickly or slowly.
- This knowledge can be used to plan and prepare for potential changes to the earth’s surface in order to help people stay safe.

Essential Question:

How well is our school prepared for an event that occurs when the earth changes?

Criteria for Success (How will you know students have gained the understanding of the concepts?):

- Student groups will exhibit their understanding of earth changes by presenting research information about ways the earth changes and the safety issues involved.
- They will decide which event is most likely to occur in their school based upon data of event incidences and will write persuasive paragraphs defending their decisions.
- Final student products include the following options:
 - Compose a letter to an appropriate, authentic audience (principal, superintendent, school board) which analyzes the school emergency plan for that event and makes recommendations for improvement.
 - Produce an improved multimedia public safety announcement to inform and prepare community members for the selected earth changing event after analyzing a previously recorded ad. (Bulleted list of gaps and improvements required.)
 - Given a sample (inferior) home emergency plan for the selected earth change, develop an improved family safety plan to be sent home with students.

Resources (What resources will you and your students use?):

Soil Erosion and Weathering

Description

erosion

<http://walrus.wr.usgs.gov/pubinfo/jump.html>

<http://www.reachoutmichigan.org/funexperiments/quick/dirtmeister/erosion.html>

http://www.worldalmanacforkids.com/WAKI-ViewArticle.aspx?pin=x-er055800a&article_id=155&chapter_id=4&chapter_title=Environment&article_title=Erosion

www.brainpop.com/science/theearthsystem/erosion/

http://www.classzone.com/books/earth_science/terc/content/visualizations/es1205/es1205page01.cfm?chapter_no=visualization (images)

http://www.classzone.com/books/earth_science/terc/content/visualizations/es1205/es1205page01.cfm?chapter_no=visualization (images)

http://www.teachertube.com/view_video.php?viewkey=7fe2a1c54c1404863e64 (video)

weathering

<http://wrgis.wr.usgs.gov/docs/parks/misc/gweaero.html>

<http://www.env.duke.edu/eos/geo41/wea.htm>

<http://geomaps.wr.usgs.gov/parks/misc/gweaero.html>

<http://magma.nationalgeographic.com/ngexplorer/0610/articles/mainarticle.html>

<http://www.geography.ndo.co.uk/animationsweathering.htm#> (animations)

<http://www.uky.edu/AS/Geology/howell/goodies/elearning/module07swf.swf> (animation)

Prevention

<http://www.abag.ca.gov/bayarea/enviro/erosion/ecare.html>

<http://www.botany.uwc.ac.za/Envfacts/facts/erosion.htm>

<http://www.abag.ca.gov/bayarea/enviro/erosion/eps.html>

Volcanoes

Description

<http://www.enchantedlearning.com/subjects/volcano/>
<http://www.fema.gov/kids/volcano.htm>
<http://www.kidscosmos.org/kid-stuff/kids-volcanoes-types.html>
<http://www.pbs.org/wnet/savageearth/animations/volcanoes/main.html> (animation)
<http://news.bbc.co.uk/1/hi/sci/tech/4972366.stm> (animation)
<http://video.nationalgeographic.com/video/player/environment/environment-natural-disasters/volcanoes/volcanoes-101.html?fs=environment.nationalgeographic.com> (video)

Safety

http://www.fema.gov/kids/knw_vol.htm
<http://www.weatherwizkids.com/volcano.htm>
<http://www.americanfamilysafety.com/emergency-preparedness/index.php?pagename=volcano-safety>
<http://www.cepintdi.org/pdf/Volcanoes.pdf> (for the deaf or hard of hearing)

Landslides

Descriptions

http://www.ndsu.nodak.edu/nd_geology/nd_mass_wasting/index_mass_wasting.htm
<http://www.redcross.org/services/disaster/keepsafe/landslide.html#cause>
<http://www.kidsgeo.com/geology-for-kids/0071-landslides.php>
<http://video.nationalgeographic.com/video/player/environment/environment-natural-disasters/landslides-and-more/landslides.html> (video)

Safety

<http://www.redcross.org/services/disaster/keepsafe/landslide.html>
<http://www.abag.ca.gov/bayarea/enviro/erosion/eps.html>
<http://www.weatherwizkids.com/mudslide.htm>
<http://www.cepintdi.org/default.aspx?pageid=111> (for the deaf or hard of hearing)

Earthquakes

Descriptions

<http://www.crystal.ucsb.edu/ics/understanding/elastic/rebound.html>
<http://www.pbs.org/wnet/savageearth/animations/earthquakes/main.html>
<http://earthquake.usgs.gov/learning/kids/eqscience.php>
<http://earthquake.usgs.gov/learning/animations/> (animations)
<http://news.bbc.co.uk/2/hi/4126809.stm> (animation)
<http://video.nationalgeographic.com/video/player/environment/environment-natural-disasters/earthquakes/earthquake-101.html> (video)

Safety

<http://www.weatherwizkids.com/earthquake.htm>
<http://www.dnr.mo.gov/geology/geosrv/geores/what2do.htm>
<http://www.quakekare.com/emergency-preparedness/earthquake-preparedness.html>
http://www.matserv.ucla.edu/Earthquake_Safety/earthquake_safety.html
<http://www.redcross.org/services/disaster/keepsafe/readyearth.html>
<http://www.abag.ca.gov/bayarea/eqmaps/fixit/fixit.html>
<http://www.pe.com/reports/quake/misc/quake/before.html> (interactive)
<http://www.pe.com/reports/quake/misc/quake2/> (interactive)

Floods

Descriptions

<http://www.usatoday.com/weather/wfldfac.htm>
<http://www.fema.gov/kids/floods.htm>
<http://www.fema.gov/hazard/flood/index.shtm>
<http://library.thinkquest.org/C003603/sims/flooding/index.html> (simulation)

<http://video.nationalgeographic.com/video/player/environment/environment-natural-disasters/landslides-and-more/floods.html> (video)

Safety

<http://www.weatherwizkids.com/flood.htm>

<http://www.redcross.org/services/disaster/keepsafe/readyflood.html>

<http://www.fema.gov/kids/protect.htm>

http://www.fema.gov/hazard/flood/fl_before.shtm

http://web.extension.uiuc.edu/disaster/storm/sw_flood.html

http://www.theweatherchannelkids.com/images/floods_one_sheet.pdf

<http://www.cepintdi.org/pdf/Floods.pdf> (for the deaf or hard of hearing)

Additional Emergency Preparedness Sites

<http://www.cepintdi.org/default.aspx?pageid=174> (for the deaf or hard of hearing)

<http://www.72hours.org/>

School-District Emergency Plan

Local Public Safety Announcements

Sample Family Safety Plans

Nonfiction Books at Various Reading Levels

Earthquakes, Seymour Simon

Earthshake, Lisa Westberg Peters & Cathie (ILT) Felstead

Erosion, Virginia Castleman

Erosion, Rebecca Olien

Flood: Wrestling with the Mississippi, Patricia Lauber

Landslides, Slumps, and Creep, Peter Goodwin

Volcano: The Eruption and Healing of Mount St. Helens, Patricia Lauber

Volcanoes and Earthquakes, Terry Jennings

Management (How will students share technology resources? How will you break up the lesson into segments—the number of hours or days?)

- During five to seven 90 minute science investigations blocks, students will:
 - research ways the earth's surface changes slowly and quickly,
 - identify which of these changes might endanger people,
 - determine the frequency of event occurrences,
 - conclude which event is most likely to occur in Missouri,
 - evaluate current publications or multimedia ads addressing that event
 - school district's emergency preparedness plan
 - public service announcements
 - home preparedness plans
- During three to five 90 minute communication arts sessions, students will:
 - Develop and deliver presentations that demonstrate what each group learned on ways the earth changes which might endanger people.
 - Create a communication tool (letter, public service announcement, or safety plan) to be shared with an authentic audience (e.g. the principal, superintendent, school board, parents, community at large)
- Student pairs will share computer use according to classroom protocols and team developed plans. For example, computer partners will take turns controlling keyboard and/or mouse. *See Explore and Explain sections for more detailed information.*
- Students will access files from and save files to shared network folders. *See Engage and Explore sections for more detailed information.*
- Students will work in cooperative groups. *See more detailed explanation in*

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| <i>the Explore section.</i> |
| Learner Diversity (What diverse learner needs do you need to consider when selecting resources, grouping students or planning the culminating project? Are there any special considerations such as assistive technologies or second-language learning to take into account?) |
| <ul style="list-style-type: none"> • Color cards used to form cooperative groups should be handed out in a manner that appears random but actually forms pre-established homogeneous groups. By doing this, students will still be able to choose their expert area, and yet each expert area team will be heterogeneous to allow for diverse peer support during research process. • Student reading levels were taken into consideration when selecting both Internet and print resources. • Internet and some print resources will be made available in Spanish to facilitate learning for ELL students. • CyberBuddy may be used on specific machines to translate sites for ELL students and/or provide Text to Speech function for Web page content when this assistive technology is required. http://thecyberbuddy.com/ • Students selecting final product options 2 or 3 may collaborate with bilingual students and district translators to make their product available in both English and Spanish. |
| Engage: Capture the students' attention, stimulate their thinking and help them access prior knowledge. |
| <p>Day 1</p> <ul style="list-style-type: none"> • Display images of various natural changes to the earth's surface such as floods, earthquakes or erosion, show a video of a natural change (<i>see links above</i>) and/or review newspaper headlines about natural changes to the earth. <ul style="list-style-type: none"> ◦ Earthquake photos http://www.fema.gov/kids/p_eq.htm ◦ Erosion photos http://science.nationalgeographic.com/science/photos/weathering-erosion-gallery.html ◦ Landslide and Missouri flood photos are available at http://www.photolibrary.fema.gov/photolibrary/photo_search.do?action=Clear+Form ◦ Volcano photos http://www.fema.gov/kids/p_vol.htm • Ask teams of four to Round Robin brainstorm all of the ways the earth changes. Tell them to think about news shows and movies they have seen, as well as natural events they have witnessed. Record their ideas on the SMART Board (in SMART Notebook) utilizing Team Stand and Share. • After developing a good list, add two additional Notebook pages: Earth Changes Which Endanger People and Earth Changes Which Do Not Affect Peoples' Safety. • Save this 3-page SMART Notebook file into a network shared folder, and have student pairs open the file on their computer and rename by adding their student numbers. Next, partners will categorize the statements by dragging each to the SMART Notebook page showing (what they think has) the applicable heading. • Open one pair's completed sort on the SMARTBoard to discuss and gain class consensus for item placement in each category, making changes as consensus indicates. • Pose (and post) the essential question, "How well is our school prepared for |

an event that occurs when the earth changes?" This is the lesson's overarching question. Prior to answering this question, it will be necessary for students to generate subsidiary questions and develop background knowledge about earth changes.

- o *Student question development is outlined in explore section since it is completed by expert teams and fits well in that area.*

Explore:

Give students time to think, plan, investigate and organize collected information.

Successful completion of this project depends on peer collaboration. If not already in place, this would be the time to generate group norms. If norms have already been determined, have students review them and reiterate expectations for respectful interactions, explaining, listening, and group decision-making.

- Cooperative teams will be formed by giving students color-coded cards. Those with the same color card will briefly meet in a group of five to negotiate and decide who (from that color choice) will become the expert on each of five class selected earth changes e.g., ***Earthquakes, Erosion, Floods, Landslides, Volcanoes.***

Days 2-4

- Students will regroup with those researching the same earth change to form expert teams. In order to continue accessing prior knowledge and to generate questions to guide research, each expert group will develop a KWL chart (What we **K**now, What we **W**onder, What we **L**earned) for their earth change. (Charts will also be saved in shared folder so that team members may change and/or add to the KWL as they research.) Encourage them to think about how people are in danger during these events and what they might do to prepare for an event. As you monitor group interactions, ask guiding questions as needed. During group conference, finalize/highlight questions to guide their research.
- Each expert group will then construct a plan of action to research these questions by setting completion goals within the 3 class periods provided, dividing and conquering preapproved online and print resources (and/or the questions) with the understanding that every two students will share one computer and observe class protocol for taking turns controlling keyboard and/or mouse. **Some online resources are also available in Spanish.*
 - o Students will use a two page [I-Search](#) form to facilitate organization of research information for each guiding question.

Explain:

Involve students in an analysis of their explorations. Reflective activities clarify and modify their understanding.

Days 5-7

- Upon completion of their research, expert group pairs will create a mind map for their aspect of the researched earth change to clarify their understanding and to aid in presenting learned information. (Students will use concept mapping software such as Inspiration or SMART Ideas and should label links between nodes. A mini-lesson review on developing mind maps and concept maps will be presented prior to map development.)
- Each expert group will then work together to share researched information on their particular earth change and will merge pairs' mind maps into one comprehensive concept map for their expert area adding nodes as

necessary.

- Next, students in the same expert group will devise a method for presenting information to the class. Choices include creating a PowerPoint presentation, poster, song, skit, or any other form of communication that reflects the learning style strengths within the group and which exhibits what they have learned. (Each team's final concept map will also be evaluated to check for understanding.)
- After each group has presented, utilize the Stand Up, Square Up, and Share strategy to give individual students an opportunity to ask/answer questions of other class members (NOT on their expert team).

Elaborate:

Give students the opportunity to expand and solidify their understanding of the concept and/or apply it to a real-world situation.

Days 8-10

- Propose the questions: Which of these events is most likely to occur at our school? Is the school ready for this event?
- Provide websites with data of event occurrences in Missouri. Have the original color teams determine which incidence they believe is most likely to occur in their area. After exploring resources, each team should reach a consensus on which earth change they believe poses the greatest danger for the school and be prepared to support/explain their decision during team/teacher conference.
 - Earthquakes http://www.eas.slu.edu/Earthquake_Center/index.html
<http://www.dnr.mo.gov/geology/geosrv/geores/HistoryMOeqs.htm>
 - Floods <http://tinyurl.com/4vj3vg>
- To accommodate diversity in student learning styles and interests, students will apply research information to generate one of these final student products options:
 1. Use Word to compose a letter to an appropriate, authentic audience (principal, superintendent, school board) which analyzes the school emergency plan for that event, addresses the possibility that such an event might occur at the school, assesses the adequacy of the school's preparations, and makes recommendations for improvement.
 2. Create an improved multimedia public safety announcement using MovieMaker to inform and prepare community members for the selected earth changing event. It should include the historical frequency of such events in the area and recommend safety measures to be taken for possible future occurrences. *Announcements will air on school information channel.* (Improvements should be based on analysis of a previously recorded example. Bulleted list of gaps and improvements will be required.)
 3. Develop a quality family safety plan for the selected earth change. Include safety measures to be taken before, during, and after the event. *Plan will be sent home for parental use/information.* (Family Safety Plan should reflect improvements over a provided sample home emergency plan. Bulleted list of gaps and improvements required.)
- Individuals will complete project exit slips reflecting on learned information and any conclusions drawn through the process.

Evaluate:

Evaluate throughout the lesson. Present students with a scoring guide at the beginning. Scoring tools developed by teachers target what students must know and do. Consistent use of scoring tools improves learning.

- Team members will complete [Cooperative Group Self-Evaluations](#) and [Cooperative Team Evaluations](#) every other day throughout the learning process to reflect on and assess cooperative group interactions and progress. (May be completed more frequently if necessary.) (Will address 2.3, 4.5, 4.6)
- Team concept map rubric will assess accuracy and completeness of each expert group's research on their specific earth change. It will address earth change description and recommended safety measures before, during, and after the event. Rubric will be provided to teams before group plan is developed. (Will address 1.1, 1.2, 1.4, 1.8; SC5, CA3; NETS-S 2b, 4c, 6b)
- Formative assessments based on student-generated group plans will be completed on information gathering, sorting, and organizing in the form of checklists and anecdotal records. (Will address 2.1, 4.5)
- Rubrics for skit, puppet show, oral presentation, and poster generated through Tech4Learning's Rubric Maker will be shared with students before making presentation choice. (Will address 1.8, 2.1; CA4, CA6; NETS-S 2b)
- Before beginning the final project, a discussion of task objectives will be facilitated; exemplary standards for the final product options will be generated by the whole class and posted on chart paper. Scoring guides will be built from these criteria. (Will address 1.8, 2.1, CA3, CA4, CA6, NETS-S 2b, 4c, 6b)

The eMINTS staff has adapted this form from materials available at this website: <http://www.mdk12.org/instruction/curriculum/science/5emodel.html>.

I-Search

Name(s) _____ Date _____

Question _____

What do I already know?

Information:

How do I find the information I need?

Sources:

What the Sources Said:

What did I discover?

| | |
|---|--|
| What do I still want to know? | |
| What do I think about what I've learned? | |
| How do I feel about what I've learned? | |

(Adapted from Nancy Lee Cecil's *The Art of Inquiry*)

| Expert Team Evaluation | Date |
|---|------|
| Honestly reflect on your cooperative group work. Agree on a team answer for each statement. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No We encouraged each other. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No Everyone did his or her job. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No Everyone exchanged information, ideas, and questions respectfully. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No Everyone participated in group decisions recognizing perspectives of others. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No We achieved our goals for the day. | |
| We did a great job at... | |
| Next time we could improve by... | |
| Expert Team Signatures | |
| | |
| | |

| Cooperative Learning Self-Evaluation | |
|--|------|
| Expert Team | |
| Name | Date |
| Reflect on your job as a team member today. Mark your honest answer for each statement. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No I used my time wisely. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No I participated in group discussions and decisions. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No I listened respectfully to all members of my group. | |
| <input type="checkbox"/> Yes <input type="checkbox"/> No I supported other group members in reaching their learning goals. | |
| I was a good team member today because I | |
| The most important thing I learned today was | |