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| Project DESIGN: OVERVIEW page 1 | | | | | | | | | |
| **Name of Project: Geospatial Inquiry Mapping Project - Using ArcGIS to Visualize Potential Natural Disasters and their Impact on the Nation’s Power Grid** | | | | | | | **Duration:** 4 days (6 hours) | | |
| **Subject/Course:** Geology, Earth Science, Geography | | | **Teacher(s):** Nick Sirek | | | | **Grade Level:** 10-12 | | |
| **Other subject areas to be included, if any: Basic electric power generation and transmission** | | | | | | | | | |
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| **Significant Content**  (CCSS and/or others) | **Geology:**  **Embedded Inquiry, Technology and Engineering**  **Standard 1 – Maps**  **CLE 3205.1.1** Read and interpret topographic and geologic maps  **CLE 3205.1.2** Use geologic maps to investigate rock types, time periods, faults and folds  **CLE 3205.1.3** Investigate technologies used to create maps  **CLE 3205.1.4** Apply maps for planning purposes and to investigate land-use problems | | | | | | | | |
| **21st Century Competencies**  (To be taught and assessed) | **Collaboration**- Partner Group Project | | |  | | **Creativity and Innovation** – Presentation choice reflective of each presentation group | | |  |
| **Communication** – Discussions internal and external to groups, class discussions | | |  | | **Geospatial Awareness -** | | |  |
| **Critical Thinking** – evaluation of appropriate an relevant data to include on a risk assessment map | | |  | | **Other:** Real World Project Based Learning | | |  |
| **Project Summary**  (Include student role, issue, problem or challenge, action taken, and purpose / beneficiary) | Students will use ArcGIS to investigate the impact of an area’s natural disaster potential to disrupt power supplies (and other utilities) in the United States. The task is for students to manipulate ArcGIS layers (creatively thinking about what factors qualify as “hazardous”) to identify and prepare for potential natural disasters at various levels of society (personal, family, neighborhood, city, county, state or regional). Students will create an ArcGIS map, which shows the layers they chose that has the greatest potential to impact a sizable population and to discuss ways that a sector of society should prepare for such a natural disaster. Students will present their map and their geospatial analysis, decision-making process and individual/community action plan to the class in a Power Point and Public Service Announcement (PSA) format. | | | | | | | | |
| **Driving Question(s)** | **Main Driving Question:** “Where’s the safest (geologically) place to live in America?”  **Extension Example Questions:**  “What is the potential for a significant natural disaster (i.e. 6.5+ earthquake) occurring in the  midcontinent (New Madrid Seismic Zone) and its impact on the Nation’s electrical power grid?”  “What would this mean to people living in nearby and surrounding areas?  “What are possible solutions for living in this active seismic zone? ” | | | | | | | | |
| Project DESIGN: OVERVIEW page 2 | | | | | | | | | | |
| **Entry Event** | “American Blackout” website (www.survivetheblackout.com) along with an overview of natural geologic hazards. We live in a terribly dangerous world! Hazards lurk around every corner! Your task is to create a map that illustrates a natural geologic hazard location and how it could potentially impact various aspects of daily life (i.e. electrical power grid, communications, transportation, other utilities) | | | | | | | | |
| **Products** | Individual:  An ArcGIS map with multiple layers and added areas that clearly indicate a chosen location. | | | | | Specific content and competencies to be assessed:  Mapping, geospatial analysis, critical thinking | | | |
| Team: (pairs)  Oral presentation of conclusion with visual supports; presentation will include description of the geologic hazard  and decision-making process along with final conclusion. | | | | | Specific content and competencies to be assessed:  Mapping, geospatial analysis, critical thinking | | | |
| **Public Audience**  (Experts, audiences, or product users students will engage with during/at end of project) | | High School Geology/Earth Science students  Power supply and transmission experts (CURENT, EPRI, KUB)  Affected community members - if applicable | | | | | | | | |
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| **Resources Needed** | | **On-site people, facilities:** Instructor familiar with ArcGIS program and applications, computer access; internet; any specific materials for presentation as chosen by students | | | | | | | | |
| **Equipment:** Computers with internet access, student/school account @ [ArcGIS.com](Arcgis.com) (free), color printer, handheld GPS units (optional) | | | | | | | | |
| **Materials:** Markers, poster board (optional) | | | | | | | | |
| **Community Resources:** Current copies/examples of community action plans for various natural disasters | | | | | | | | |
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| **Reflection Methods**  (Individual, Team, and/or Whole Class) | | Journal/Learning Log |  | | Focus Group | | |  | | |
| **Whole-Class Discussion**  Class will reflect on the geospatial process and findings and discuss spatial awareness |  | | Fishbowl Discussion | | |  | | |

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| Project Design: student Learning Guide | | | |
| **Project: Geospatial Inquiry Mapping Project - Using ArcGIS to Visualize Potential Natural Disasters and the Nation’s Power Grid** | | | |
| **Driving Question:** Where’s the safest place to live in America? | | | |
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| **Final Product(s)**  Presentations, Performances, Products and/or Services | **Learning Outcomes/Targets**  content & 21st century competencies  needed by students to successfully  complete products | **Checkpoints/Formative Assessments**  to check for learning and ensure  students are on track | **Instructional Strategies for All Learners**  provided by teacher, other staff, experts; includes  scaffolds, materials, lessons aligned to learning outcomes and formative assessments |
| (Individual **and** Team) | * Students will understand how to use, read, and manipulate maps on ArcGIS | * Teacher will circulate to answer questions and check student understanding and progress | * Whole class instruction with modeling on ArcGIS.com * Individualized help for differentiation |
| * Students will understand geospatial analysis and the decision making process | * Students will research job availability, housing costs, transportation costs and turn in those reports in “chunks” | * All learners will use online resources to research geologic hazards in their chosen area of the country * Teacher will provide individualized help with this process |
| * Students analyze and synthesize data observed from multiple sources to make a decision and justify their choice | * Students will turn in small “chunks” of their project at a time (hazard analysis; financial reports; final conclusion) | * Students will use ArcGIS and online resources to complete their geospatial analysis |
| * Oral Presentation | * Students submit a completed ArcGIS map, and verbally present their work to the class in a power point presentation | * Students share their maps via ArcGIS and will be assessed on their presentation by the teacher |