Mapping Geospatial Technologies to Core Curriculum Standards

Subject	Academic Curriculum Standards	How Geospatial Technologies (and GIS Software) Can be Utilized to Meet the Standards
Science and Engineering Practices (Grades 6-8, 9-12)		
	Asking Questions and Defining Problems	Students may hypothesize about human activity impacts to the environment and test this through data collection using GPS units, scientific equipment, and GIS software. Real-world problems can be solved using GIS software in a spatial and visual context.
	Developing and Using Models	Spatial data used in GIS software represents a simplified model of the world around us. Use of the software requires understanding of models and how best to represent geographic features in a computer-based environment.
	Planning and Carrying Out Investigations	Similar to the above example, students may design an investigation and collect data about their community or a broader geographic area to solve a problem.
	Analyzing and Interpreting Data	Spatial representation of data provides a means for spatial analysis - investigation into the proximity of one object to another, geographically linked properties, etc.
	Using Mathematics and Computational Thinking	GIS allows for computations of physical properties such as area and distances along with development of specialized queries using mathematical expressions.
	Constructing Explanations and Designing Solutions	GIS allows for analysis of spatial relationships such as proximity analysis, clustering, and quantitative evaluation of physical features in the world around us.
	Obtaining, Evaluating, and Communicating Information	It has been said that a picture is worth a thousand words and a map showing collected data, analysis of the data, and solutions/relationships between features in the map may be worth 10,000 words. All of these things are possible using geospatial technologies.
Mathematics - Process Standards (Grades 9-12)		
	Algebra	Students may represent situations and solve real-world problems using symbolic features and algebraic expressions to analyze data in the attribute tables of GIS software while operating in a spatial context.
	Geometry and Measurement (combined)	Most features "modeling" the real world in GIS are represented by points, lines, or polygons. Built into the GIS software is an ability to measure features whether it be length of a roadway, perimeter of a building, or area of a pond. Additionally, area in various units of measurement can be calculated within the background data tables. Proximity analysis allows for identification of an area around a point at a specified distance to identify all the features that may fall within that zone. Measurements made in the software can be compared to "real world" measurements made by students to discuss accuracy and scale considerations.

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	Data Analysis and Probability	Students may represent geographic features within GIS software using bar graphs or pie charts representing attributes of the feature (e.g., ratio of male to female head of household within census tracts, income levels, or a range of water quality measurements along a stream bank) to look at broader spatial trends within communities or regions.
Social Studies- Process Standards (Grades 6-8, 9-12)		
	Acquiring Information	Students may explore the world using Google Earth, online mapping resources, and create their own maps using data from the local community to examine changes in landuse over time, develop proximity relationships, etc.
	Analysis of Data and Problem Solving	Students may obtain data from online databases along with collecting data themselves using GPS devices to evaluate trends in population shifts, epidemic outbreaks, etc.
	Communication	Students may create maps and reports showing spatial analysis results of data loaded into mapping software which has been symbolized based upon underlying attributes or properties to identify trends.
	Historical Awareness	Through use of geospatial technologies, students can look at historic data related to events at local to international scales (e.g., Civil war battlefield sites and political boundaries of that era can be mapped for contrast with current geographic features and political boundaries today).
World Geography - Process Standards (Grades 9-12)		
	Culture	Through use of geospatial technologies such as Google Earth, students can visit other countries without leaving the classroom.
	Economics	One of the key data layers often utilized in GIS analysis is U.S. census data that includes average household income and other demographic properties. Geospatial technologies can be used to identify/evaluate food deserts, under served populations and at risk populations.
	Geography	Inherent in geospatial technologies is geography. Everything and every person occupies some element of space and this location as well as the natural and man-made features around us can be mapped using the software technologies for analysis.
	Governance and Civics	The drawing of political boundaries has long been an outcome of spatial data analysis using geospatial technologies or cartography skills. In today's world, candidates for political office utilize demographic data and political boundaries such as census blocks to plan out door-knocking campaigns and target potential voters. Elections have been won using these techniques.
	History	Settlement, migration, war battle lines and political boundary changes as a result of these can all be mapped and studied using geospatial technologies.