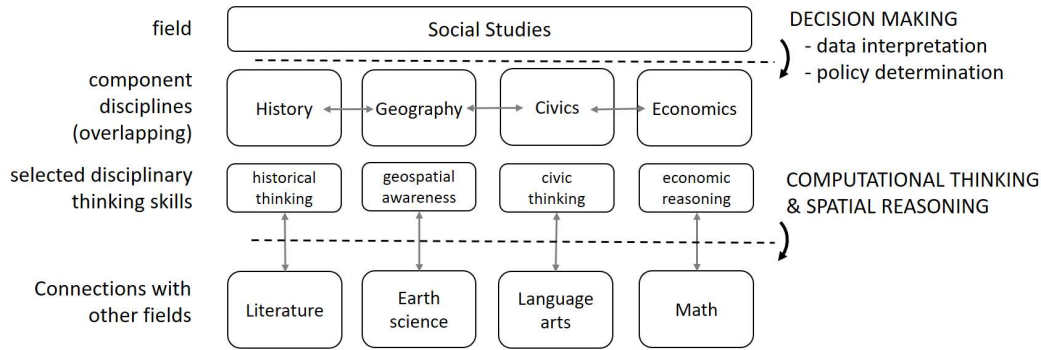


Better together: Teaching social studies with computational thinking & spatial reasoning

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What kind of social studies?

DECISION-FOCUSED social studies (working from Engle, 1960)

Implied question—example: “Do you select A or B?”

- “What does this data mean? What is the pattern? Does it generalize to other contexts?”
- “What policy should be followed?”

What kind of spatial reasoning & computational thinking?

SPATIAL REASONING (NRC, 2006)

- Understanding spatial data
- Place & location (data definition)
- Pathways (point-to-point)
- Distance vs. proximity
- Boundary & containment
- Regions (including nesting)
- Density vs. dispersion
- Outlier vs. trend

COMPUTATIONAL THINKING (Grover & Pea, 2013)

Problem-solving that can use computers effectively

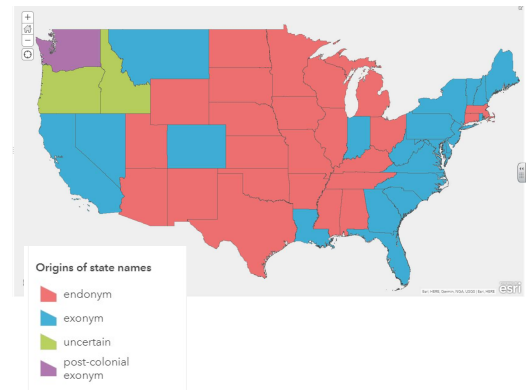
- Data definition
- Decomposition
- Abstraction
- Generalization
- Algorithms (rules)
- (Automation, recursion, de-bugging, etc.)

Examples

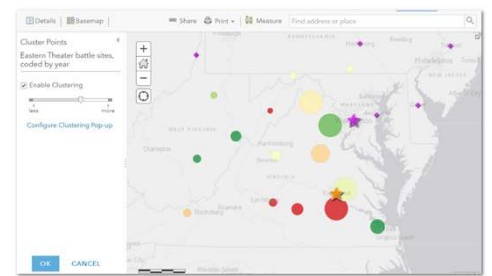
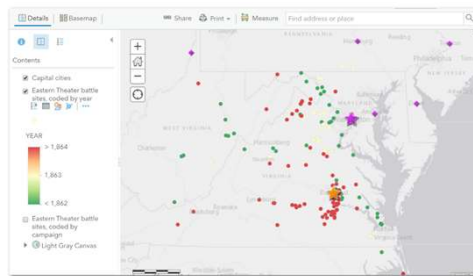
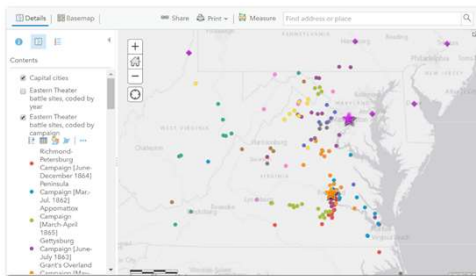
1. What’s in a Place Name?

1	Colony name	Category	Explanation	Detail
2	Connecticut	endonym	Indigenous place name adopted by colonizers	Algonquian word meaning “beside the long tidal river”
3	Massachusetts	endonym	Indigenous group name adopted by colonizers as a place name	Massachusetts people, “people of the great hills”
4	Delaware	exonym	Colonizer place name derived from patron	Bay and river named after Baron De La Warr
5	Georgia	exonym	Colonizer place name derived from patron	Henrietta Maria, queen with Charles I
6	Maryland	exonym	Colonizer place name derived from patron	Duke of York Charles I of England
7	New York	exonym	Colonizer place name derived from patron	Adm. Sir William Penn, father of William Penn
8	North Carolina	exonym	Colonizer place name derived from patron	Charles I of England
9	Pennsylvania	exonym	Colonizer place name derived from patron	Elizabeth I, “Virgin Queen” of England
10	South Carolina	exonym	Colonizer place name referencing a location in Europe	English county of Hampshire
11	Virginia	exonym	Colonizer place name referencing a location in Europe	Chanelle Isle of Jersey
12	New Hampshire	exonym	Colonizer place name referencing a location in Europe	Greek Island of Rhodes
13	New Jersey	exonym	Colonizer place name referencing a location in Europe	
14	Rhode Island	exonym	Colonizer place name referencing a location in Europe	

1	State name	Category	Explanation	Detail
2	Mississippi	endonym	Indigenous group name adopted by colonizers as a place name	French rendering of an Anishinaabe term “Great River” (Misi-zibi)
3	Alabama	endonym	Indigenous group name adopted by colonizers as a place name	From Choctaw for “vegetation pickers,” in reference to local farming practices.
4	Arkansas	endonym	Indigenous group name adopted by colonizers as a place name	French version of the Illinois name for the local Quapaw people.
5	Kentucky	endonym	Indigenous place name adopted by colonizers	Iroquoian word for “land of tomorrow” (Ken-tah-ten)
6	Ohio	endonym	Indigenous place name adopted by colonizers	Seneca word meaning “great river”
7	Illinois	endonym	Indigenous place name adopted by colonizers	French version of an Algonquian word for local inhabitants
8	Missouri	endonym	Indigenous place name adopted by colonizers	“Town of the large canoes” in local language
9	Michigan	endonym	Indigenous place name adopted by colonizers	Ojibwe word meaning “great or large lake” (mishigamae)
10	Tennessee	endonym	Indigenous term adopted by colonizers	Uncertain, possibly from a Cherokee rendering of a Yuchi word.
11	Vermont	exonym	Colonizer place name derived from patron	French for “green mountain” (vert mont)
12	Louisiana	exonym	Colonizer place name derived from patron	Louis XIV of France
13	Maine	exonym	Colonizer place name derived from patron	From colonial term for islands (vs. mainland), possibly referencing Henrietta Maria (owned French province of Mayne)
14	Indiana	exonym	Colonizer place name referencing a location in Asia, which was misattributed to places/people in western hemisphere	“Land of Indians” using a traditional Latin suffix.



2. Civil War battles – Eastern theater



Suggested Data, Patterns, Rules & Questions (DPR-Q) Heuristic

DATA	PATTERNS	RULES
<ul style="list-style-type: none"> • What are we looking at? • In what way is this an abstraction? 	<ul style="list-style-type: none"> • What is the pattern, if any? If there is a pattern, what are the outliers? • If we decompose the problem, does the pattern change? 	<ul style="list-style-type: none"> • Does this pattern generalize – that is, does it repeat under other circumstances? What factors seem to be important?
QUESTIONS <ul style="list-style-type: none"> • What else would you need to know to better understand the data, the patterns, and any rules observed above? • Is there different data that you would like to consult? • (etc.) 		

REFERENCES

- Engle, S. H. (1960). Decision making: The heart of social studies instruction. *Social Education*, 24, 301-306.
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- National Research Council. (2006). *Learning to think spatially: GIS as a support system in the K-12 curriculum*. Washington, DC: National Academies Press.

FURTHER READING

- Hammond, T.C., Oltman, J., & Salter, S. (2019). Using computational thinking to explore the past, present, and future. *Social Education*, 83, 118-122.
- Hammond, T.C., & Oltman, J. (In print). Bridging STEM and the civic mission of social studies: Integrating spatial reasoning & computational thinking into decision-focused secondary social studies instruction. In D. Gibson & M. Ochoa (Eds.), *Research highlights in technology and teacher education 2019*. Waynesville, NC: Association for the Advancement of Computing in Education.