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## WHAT IS AN EXPERT MAP USER?

When studying a map, an expert map user is able to employ more kinds of spatial thinking, and to use each one of them more effectively, than a novice. Expertise in map reading implies the ability to go beyond simply identifying locations on a map and decoding symbols to get information about conditions and connections at specific places. In short, an expert map user is able to <u>reduce</u> overall cognitive load by making effective use of other neurologically distinct modes of spatial reasoning.

**LOCATION:** An expert map reader can use the grid, scale, direction arrow, political borders, coastlines, and other clues to describe the location of any feature on a map.

- a. CONDITIONS: An expert map reader can decode the symbols on a map and make valid statements about conditions at any specified location on the map.
- **b. CONNECTIONS:** An expert map reader can decode the symbols on a map and make valid statements about connections between locations on the map.

## SPATIAL REASONING

- 1. **COMPARISON**: An expert map reader can make a verbal and/or graphic comparison of conditions or connections at several locations on a map.
- 2. **AURA**: An expert map reader can identify places on a map that are likely to be influenced by a specific event (or a specific feature) in a particular place on the map.
- 3. **REGION**: An expert map reader can identify groups of places on a map (regions) that are close to each other and have similar conditions or connections.
- 4. **TRANSITION**: An expert map reader can describe how things change between two places (is a change in elevation, for example, a gradual uphill slope or a steep cliff?)
- 5. **HIERARCHY**: An expert map reader can describe where an area fits into a hierarchy of smaller-to-larger areas (e.g. counties within a state, states within a country).
- 6. **ANALOGY**: An expert map reader can identify distant places that have similar situations (e.g. latitude or distance from a port) and therefore might have similar conditions.
- 7. **PATTERN**: An expert map reader can identify features arranged in a non-random way on a map (i.e. have spatial patterns that may be effects of some cause).
- 8. **ASSOCIATION**: An expert map reader can compare patterns on maps and identify features that tend to occur together (and therefore might also be linked in other ways).

## SPATIO-TEMPORAL THINKING

- 1. **CHANGE**: An expert map reader can use maps made at different times to describe changes in conditions or connections at a place, and to predict possible future change.
- 2. **MOVEMENT**: An expert map reader can use maps made at different times to identify things that might have moved, and to predict possible future motion.
- 3. **DIFFUSION**: An expert map reader can use maps made at different times to describe changes in the extent of something, and to predict possible future spread (or shrinkage).

SPATIAL MODELS: An expert map user can use these map-reading skills to test hypotheses about how features or events in one place can affect conditions or connections in other places, often far away.

**EXCEPTIONS:** An expert map user can identify places that do not "fit the rules" one might infer by using the skills described above. An expert can map the exceptions, identify regions, patterns, associations, etc. on it, and suggest hypotheses for investigation.