The challenge of education

• As the technology becomes easier to use
  – as everyone utilizes geospatial technology

• What does everyone need to know?

• Critical spatial thinking
  – an understanding of the fundamental concepts behind the technology

• What characterizes a spatial thinker?
Critical spatial thinking

• Larger than GIS
  – now that the technology is easier to use
• What every Google Earth user needs to know
• Focus on fundamental spatial concepts
  – from simple, acquired in early childhood
  – to advanced, acquired in college
• One of Gardner’s seven types of intelligence
  – almost entirely neglected in education
What is spatial thinking?

“Three aspects of spatial ability:

• Spatial knowledge
  – symmetry, orientation, scale, distance decay, etc.

• Spatial ways of thinking and acting
  – using diagramming or graphing, recognizing patterns in data, change over space from change over time, etc.

• Spatial capabilities
  – ability to use tools and technologies such as spreadsheet, graphical, statistical, and GIS software to analyze spatial data”

http://www.nap.edu/catalog/11019.html
“...spatial thinking is pervasive: it is vital across a wide range of domains of practical and scientific knowledge; yet it is underrecognized, undervalued, underappreciated, and therefore underinstructed.”

National Research Council 2006 report: Learning to Think Spatially [Read Excerpts]

teachspatial.org is a collaborative, interactive website devoted to improving our understanding of how spatial thinking contributes to science and society, and to providing resources that promote applications of spatial concepts and spatial tools in teaching and learning. The site features three parts:

Part 1 enumerates and defines core concepts of spatial thinking, presented in the original words of authors from 18 source documents. Users of the site are invited to read the original publications to appreciate the contextual frameworks used by these authors. Please contribute to expanding the range of disciplines and specializations represented by suggesting additional source documents for inclusion.

Part 2 presents schemas that interpret, synthesize, and model aspects of spatial thinking that draw on and interact with selected concepts from part 1. Please submit your own schema and explanatory text; and please join others with commentary and questions for online discussion.

Part 3 will provide an archive of user-contributed resources for teaching and learning. Please share your pedagogic strategies, exercises, demonstrations, and course syllabi for use and consideration by others in their efforts to enhance spatial literacy.

Karl Grossner
www.teachspatial.org
place

in place

**Source:** Tversky (2005)

Constituents of the space of navigation include places, which may be buildings or parks or piazzas or rivers or mountains, as well as countries, planets or stars, on yet larger scales. Places are interrelated in terms of paths or directions in a reference frame (p 9). Places [are] configurations of objects such as walls and furniture, buildings, streets and trees...(p 10).

Read more

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**Source:** de Smith, et al. (2003)

The divisions of the world, recognized. e.g., as place names, landmarks, rasters, polygons, reporting zones, tessellations, etc. 'At the centre of all spatial analysis is the concept of place. The Earth's surface comprises some 500,000,000 sq km, so there would be room to pack half a billion industrial sites of 1 sq km each (assuming that nothing else required space, and that the two-thirds of the Earth's surface that is covered by water was as acceptable as the one-third that is land); and 500 trillion sites of 1 sq m each (roughly the space

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**Source:** Kaufman (2004)

(an object) exists at some absolute place or position within the latitude and longitude coordinates shown, and at a place relative to other objects or areas (p 174)
Other spaces...
• Exchange ideas and resources
• Promote new tools, research, and applications
• Enhance spatial literacy
• Community of spatial thinkers

• Web portal on spatial UCSB
• Seminars and workshops
• Spatial help desk
• General course(s) on spatial thinking