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The Education Challenge for Building a Nation of Spatial Thinkers

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Workforce development represents an **Education Challenge**, K-12, undergraduate and beyond.

- Howard Gardner, developmental psychologist in education, describes 7 forms of human intelligence, one of which is spatial. Yet, spatial thinking (unlike verbal, mathematical, social intelligence) is not taught in a formal way. It is regarded as intuitive gift, you have it or you don't. Yet, researchers with the NSF-supported Spatial Intelligence Learning Center (SILC) (Temple, Northwestern, Chicago, Chicago Pub schools; see <http://spatiallearning.org/>) have demonstrated that spatial thinking and spatial tasks can be learned / that students can master spatial skill sets.
- From my own experience, especially over the past 10 years, affiliated with the Center for Spatially Integrated Social Science (www.csiss.org), the dissemination of spatial reasoning skills and tools as expanded significantly, in part, because of innovations in information and communication technologies, software, accessible spatially enabled hardware. Whereas eleven years ago, CSISS weeklong workshops focused on techniques and specific software, workshops have shifted to greater and greater attention to the basic concepts that underlie spatial thinking.

This revolution (however defined re: Google Maps, GIS, GPS-enabled personal assistants) has inspired new perspectives on how the world is seen, how problems are solved, and how people manage their daily lives and life-time transitions.

- Much of this is occurring without a foundation of understanding of fundamental spatial concepts—distance, location, scale, neighborhood, spatial dependence, etc. At UCSB (see <http://teachspatial.org/>) we have catalogued more than 180 distinct spatial concepts from source documents of 8 different disciplines.
- Conceived broadly, spatial intelligence is embedded in nearly all forms of human endeavor—not only in those activities that we might regard as geospatial. Chemistry and materials science, physics, astronomy, music, architecture all rely on spatial intelligence. It is as relevant to religious studies and comparative literature as it is in biodiversity studies, geophysics, or geography.

We need to **tap into the 'social consciousness' of 'sense of place'** re: place-based perspectives on policy and education.

- Use *place* as a conduit to teaching and learning—motivating students through project-based teaching exercises that draw on student’s local awareness.
- The spatial perspective (concepts and tools) is an ideal framework for drawing on a student’s natural affinity to her home/local environment—it is an ideal base for motivating learning and for the natural extension of interdependence between the home and a global as well as galactic environments.

Jobs are created through innovation; equipping students/citizens with powerful new skill sets that encourage/inspire innovative applications and innovative entrepreneurship.

- This is happening in science. Whereas a decade ago, it was still difficult to convince health practitioners, epidemiologists, economists, or political scientists that there is added value achieved only through spatial insight and methodology. Today this is a much easier task; even a *Nature* 2008 (no. 453 (2)) editorial makes the point that scientists have to capture geo-referenced detail about field observations to ensure that this added interpretive power is not lost.
- At UCSB, we are now engaged in an across-the-board approach to a proposal for a minor’s program in spatial studies that is relevant for students in all disciplines, achieved through three broad focus areas: spatial thinking, space and place, and spatial science (see <http://www.spatial.ucsb.edu/programs/academic-minor.php>).

We believe that drawing on the power of place and on concepts and tools for spatial thinking will help **break down silos that inhibit the exchange of ideas, the suppression of innovation, and the creation of jobs.**

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