

## **Sustainability to Resilience: Implications for Global Education and Training**

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Resilience is the *new* sustainability. Previous decades have seen much attention to green, eco-friendly, “*triple-bottom line*” approaches to sustainability. The current buzzword-ish, big idea is “*resilience*.” Indeed, the somewhat curious migration from sustainable to resilient lifestyles is reflected not just by the use/overuse of the term “resilience” but also in the growth of academic disciplines and educational enterprises hoping to capitalize on it. Scan the list of academic conferences with resilience in the title. Cities are now hiring “*Resilience Officers*.” Oregon has developed a statewide resilience plan. Degree and certificate programs as well as corporate trainings tout resilience as a key learning outcome.

What is meant by resilience? Why has it emerged as such a fertile topic? Where will it go and what will it mean for global education and training? Three strategies are proposed for better alignment between education, training and resilience.

### *Multiple Meanings of Resilience*

Like sustainability, there are multiple meanings and uses of the term resilience. The dictionary definition is the “ability to become strong, healthy or successful after something bad happens” or the “ability of something to return to its original shape after it has been pulled, stretched, pressed, bent, etc.” In these definitions, one can see connections between psychology, healing, and recovery of individuals or perhaps characteristics regarding the flexibility or brittleness of particular materials of particular interest to physicists and engineers. In ecology, resilience refers to an ecosystem’s ability to respond to disturbances by either resisting damage, recovering quickly, or changing and adapting to new conditions. Advanced by C.S. Hollings (1973), *ecological resilience* relates to the persistence of species or systems or sub-systems in spite of natural or human-induced changes. *Socio-ecological systems* include more complicated interactions between humans and their environments. The connections between resilience and sustainability, especially in relation to the use, extraction, depletion of natural resources or the impacts of pollution and harmful substances on an ecosystem and larger scale raise concerns such as global warming, climate change, and sea level rise. How best, then, to straddle the disciplinary perspectives on resilience (psychological, engineering, ecological, socio-ecological, etc.) as well as the concerns pertaining to meaning, interpretation, understanding and the translation of knowledge to action.

Rockefeller Foundation (2014) has launched an effort to support cities in developing resilience plans. They’ve identified five pillars of resilience which include: 1) constant learning, 2) rapid rebound; 3) limited or “safe” failure; 4) flexibility; and 5) spare capacity. It will be interesting to see cases and practices of

these core ideas, especially in the Asia-Pacific region, perhaps, the most dynamic in the world. Measuring achievement of resilience remains challenging because of the different contexts, pre-existing conditions and vulnerabilities comparison across communities difficult. Narrowly cast, best practices with regard to safe failure or flexibility or spare capacity for municipal utilities may be within reach, although defining and measuring “constant learning” or “rapid rebound” may be harder to generalize.

These are fertile grounds for academics, researchers, and educators. For those with a multi- or trans-disciplinary bent, the making of meaning and the mastery of resilience metrics, tools, models, policies, and programs, and, of course, educational and training programs is an emerging business. In observing the growth of resilience, there seem to be a number of other characteristics or attributes of those willing to make the jump from sustainability to resilience. These include: 1) place-based orientation; 2) future-oriented; 3) belief in planning; 4) inclined towards innovation.

#### *Place-based Orientation*

Communities with a strong sense of place and commitment to maintaining or improving the quality of life seem to be more inclined to address resilience as well as sustainability. Perhaps its because they have more to lose than places lack character, identity, history, culture, and civic pride. There is emphasis on social capital and appreciation of the connections between the quality of the natural and the built environment. Place-based communities have historic preservation districts as well as parks and green areas and celebrate their natural assets, coastal areas, waterfront districts. They are keenly aware of the fragility of the balance between natural and human systems. Place-based communities also support and foster indigenous knowledge and cultural practices as part of the ecology of day-to-day living. It is no wonder that places like Portland, Oregon, or San Francisco, or New York City have been developing resilience plans.

#### *Future-Oriented*

Resilience is about change. Communities comfortable with change, anticipating and managing it are more suited for floating, testing, deliberating, and building resilience. At the heart of this is the capacity to understand and manage uncertainty. It involves understanding not what futurist Jim Dator has referred to as *possible, probable, and preferred futures* and applying methods and techniques like scenario planning and other foresight tools for grappling with messy and uncomfortable changes associated with new technologies, environmental/climatic/socio-ecological drivers, threats, and hazards. There needs to be willingness to examine “plausible worst case scenarios” and estimate what should or could happen to mitigate harm or damages. (Kim, Pant, and Yamashita, in press). In addition to baselines, “forecasts” into the future as well as “backcasts” which illustrate the specific steps to achieving desired ends are needed. Cities which have been through catastrophic disasters often respond with a renewed effort on reducing vulnerabilities (susceptibility to harm) and increasing resilience (Campanella, 2008).

### *Belief in Planning*

Among the most critical attributes of institutions and communities focused on resilience is a belief in planning. Planning is the connection between knowledge and action. It is the process by which alternatives are generated, evaluated, and chosen based on values, criteria, measures of success, knowledge, understanding and comprehension. A key dimension of planning involves understanding risk and managing it across stakeholders, disciplines, spatial and temporal scales. Risk is the likelihood of an event occurring and the consequences (either positive or negative). Negative consequences include the potential for deaths and injuries, property damage, economic losses, and disruption. Positive impacts include the potential for improvement in individual and social welfare.

### *Inclined Towards Innovation*

Those institutions and communities which have embraced resilience are inclined towards innovation. Resilience involves not just the capacity to absorb shocks and to recover quickly but also, most importantly, the ability to learn and apply the lessons from system failures and disruptions to improve performance increase reliability, and ensure continuity, stability, and functionality in spite of human or natural threats and hazards. See Kim, Pant, Yamashita (2013), for a case about a transit agency that learned from repeat hazard events). Resilient places “bounce back” quickly. They devise new and innovative approaches for restoring lost services. They cultivate businesses and industries that allow them to take advantage of the “new normal” and harness the power of natural, social, economic, and political systems.

### *Resilient Design Involves Managing Complexity*

In addition to the attributes of communities that support a “culture of resilience,” the central aspect of planning or designing for resilience involves the management of complexity. Even thunderstorms are complex entities with diverse impacts and strategies for management (Kim and Sheih, 2014). The complexity arises from the interactions between human and natural systems and the surging forces of technology which affect the handling, processing and distribution of resources, materials, commodities, information, and knowledge. Globalization has increased complexity in terms of trade, markets, and the flow of goods and services. The Internet as well as distributed, mobile systems have also accelerated the pace of change, providing both new vulnerabilities as well as increased capabilities with regard to resilience.

Complexity also arises from the diversity of cultures and the associated values, perspectives, and capabilities. This is especially true in the Asia Pacific region. While diversity can be seen as a strength or asset, it can also create factions and divisions, particularly if there is a history of conflict, oppression, or distrust. The emergence of new technologies in agriculture, resource extraction, energy production, as well as the stockpile of dangerous and hazardous materials and weaponry create ongoing challenges related to health and safety. The co-location

and growth of communities in floodplains areas prone to tornadoes, hurricanes, earthquakes, wildfires, and other hazards increase the probability of cascading disasters. The vulnerability of the poor, elderly, persons with disabilities, and other at-risk groups is intertwined with existing inequities and gaps in health and human services. The widening disparities between rich and poor both in the United States as well as across nations suggests a complex array of factors associated with the building of global resilience.

*Three Strategies for a Resilience-Based Approach in Training and Education*

While the challenges of building resilience are complicated and multi-faceted, there are actions which could support resilience. The targets for these ideas include not just academic institutions but also other training and educational partners. It should be noted that life-long learning means that education continues beyond school and formal systems. Resilience needs to be a part of occupational training and other forms of knowledge production and transfer in the community.

Three strategies for aligning training and education and resilience include: 1) a focus on the city; 2) better tools for collective risk management; and 3) make resilience part of the innovation economy. These approaches will help sustain resilience.

*Focus on the City.* Cities are visible, strategic points of influence. Now more people live in cities than in rural areas. Urbanization, especially in Asia, is rapid and ubiquitous. Cities are, historically, the places where people came for education and opportunities. Cities are major consumers of energy, water, and other resources. They serve as hubs and nodes for trade, communications, politics, and culture. Cities also represent a “system of systems” where natural systems such as climate, weather, temperature, topography, geology, and water resources intersect with the built environment (roads, drainage, water supply, wastewater, solid waste, power, buildings, etc.). Cities provide jobs, educational and cultural opportunities, and systems of governance. There is need for much deeper understanding of the interaction between social, urban, and natural systems with an eye towards not just resilience (broadly defined) but also the management and delivery of key services, and ecosystem benefits.

*Collective Risk Management.* A focus on the city provides a unique opportunity to address collective risks. Many of the threats and hazards as well as the capabilities are locally based. Rather than view the differences between psychologist, engineers, planners, ecologists, businesses, insurers, and other public and private stakeholders, what are common risks and vulnerabilities that can be addressed through a “mutual gains” approach? What are some tools and methods for joint assessment and sharing of the benefits of risk reduction that cross disciplines and economic sectors? How can data sources such as the National Household Travel Survey be used to support risk assessments such as with FEMA’s THIRA (Threat Hazard Identification Risk Assessment) process (Kim, Pant, Yamashita, 2013)? How can risks be transferred and shared across different domains and different hazards, especially

when a place can be subjected to multiple hazards (Kim, et. al., 2014)? What are the different types of insurance that can be used to spread risk and hasten the process of recovery from disasters? How does land use planning, hazard mitigation, and climate adaptation support risk reduction and resilience?

*Resilience is Part of the Innovation Economy.* Because of the emphasis on adaptation and learning, resilience needs to be positioned as part of the innovation economy, where ideas lead to new products, jobs, and increased wealth. This means that research universities and their spin-offs which hire and employ scientists, engineers, and others involved in the development and application of new technologies need to focus not just on sustainability but also on resilience. Because disasters and hazards arise from local conditions, the emphasis on cities and the related natural, built, and social systems mean that the sources for innovation are based on local, indigenous capabilities and resources. It is not just land, labor, and capital, but also local values, knowledge, and resources. It's not about the replacement of factors of production but rather the long-term management of environment, socio-cultural-political relationships, while sparking new ideas and facilitating change.

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