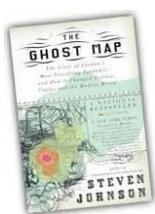


About the Summer Reading Program at the University of Vermont

The Summer Reading Program is a new student's first introduction to the academic life of the university. "The Ghost Map" by Steve Johnson is the 2013 first-year summer reading book selection. The book offers unique insights on issues of social justice throughout the lenses of public health, scientific error, and urban planning. "The Ghost Map" is a medical detective story based on the London cholera epidemic of 1854. It examines the interconnected systems from social to microbial that shape our greatest cities and govern our fates.

The role of the book selection in campus-wide discourse

"The Ghost Map" is already serving as a beacon and a guidepost for discussions across our university, and as a backdrop to intellectual discourse among our faculty, staff, and students. The book is also informing conversations about our academic programs and how we prepare and inspire our students, vision and re-envision our curricula and degree offerings, and even how we posit the University of Vermont as a distinctive and impactful land grant university.



Looking within, across, and beyond: "The Ghost Map" as a Road Map for Faculty

by D. Rosowsky

Steven Johnson's book "The Ghost Map" was selected this year for reading by all incoming first-year students at the University of Vermont. This was a wonderful selection, for which I congratulate and thank the first-year book selection committee. I enjoyed this book on many levels. It spoke to my interests in the history of science, the role of science in informing policy, disruptive technologies and disruptive thinking, communication and presentation of information, engineering and public health. I also love a great mystery.

"The Ghost Map"—part detective novel, part history of science, part social theory, and part futurist—beautifully describes the unraveling of the mystery of the deadly cholera outbreaks in London in the mid-1800's. It is also the story of a remarkable time in human history, the foundation of the world's public health systems, the conflict between emerging scientific and prevailing social theories, and even the underpinnings of today's broad-based liberal education models.

As I reflected on the book, the messages it contained, and the author's way of telling this remarkable story, it occurred to me that "The Ghost Map" could serve exceedingly well as "a road map" for how we prepare and inspire our students, vision and re-envision our curricular and degree offerings, and even how we posit the University of Vermont as a distinctive and impactful land grant university.

Our students are commencing their university education at another remarkable time in human history, a time when our world and our planet are facing problems of enormous magnitude and unprecedented complexity. These are what the National Academies have called the *Grand Challenges* of our time.

The themes that emerge in the book—the importance of critical and integrative thinking, the nature of complexity and interconnectivity, the nexus between social theory and scientific advancement, and the essential role of making information and knowledge accessible—may be more relevant today than ever before.

What are the key elements that contributed to Snow and Whitehead successfully unraveling the cholera mystery in the mid-1800's that are at least as important today as they were then? And how can (or should) they inform our university's academic programs and our students' choices during these critical years?

On Interdisciplinarity and Integrative Thinking

Snow's work, and ultimately his success, was predicated on building bridges between different disciplines and *"using data on one scale of investigation to make predictions about behavior on other scales."* Snow came to realize and fully embraced the value of cause and effect, jumping across disciplines as easily as he crossed the street, using all of his training and social skills to do so. He was a scientist and a sociologist. He was a detective and a neighbor. He was a scholar of his time and a citizen of his place.

"Snow was not interested in individual, isolated phenomena; he was interested in chains and networks, in the movement from scale to scale. His mind tripped happily from molecules to cells to brains to machines..."

The story tells of the importance of energy – as an enabling technology, a social force, and a currency – in shaping our societies throughout the ages. The confluence of scholarly fields is evident, as are the obvious merits of a liberal education that complements the study of any single discipline in depth, in this passage:

"Small bands of hunter-gatherers collected enough energy, if they were lucky, to sustain small bands of hunter-gatherers. (...) Cities were suddenly populated by a class of consumers, free to worry about other pressing matters: new technologies, new modes of commerce, politics, professional sports, celebrity gossip. That same process drove the explosion of metropolitan London after 1750. Three related developments had triggered an unprecedented intensification of the energy flowing through the capital. First, the "improvements" of agrarian capitalism (...rationalistic agriculture); second, the energy released by the coal and steam power of the Industrial Revolution; third, the dramatic increase in the portability of that energy thanks to the railway system."

The tenacity of the book's protagonists provides insight into the importance of conviction and focus, but also leads to an almost evidentiary explanation for the endurance of the miasma theory that kept Snow and Whitehead from succeeding earlier and, no doubt, led to more deaths.

"Whenever smart people cling to an outlandishly incorrect idea despite substantial evidence to the contrary, something interesting is at work. In the case of miasma, that something involves a convergence of multiple forces, all coming together to prop up a theory that should have died out decades before. Some of those forces were ideological in nature, matters of social prejudice and convention. Some revolved around conceptual limitations, failures of imagination and analysis. Some involve the basic wiring of the human brain itself. Each on its own may not have been strong enough to persuade an entire public-health system to empty raw sewage into the Thames. But together they created a kind of perfect storm of error."

This passage can serve as a road map, by itself, showing the forces that can work against scientific progress, whether evolutionary or revolutionary. Ideology and social theory are just as important as natural science and creative thought. The paragraph suggests a wonderful first-year curriculum for any university student: sociology, creativity and conceptual design, data analysis and inference, cognitive science, and public health. Who could argue that such a selection of courses, coupled with a year-long cross-disciplinary theme (with projects, lectures, and other thematically related co-curricular events), would not make a good first-year curriculum at any university?

On Preparing Our Students

By the 1930's, cholera had been largely eradicated in the world's industrialized cities and *"the great killer of the nineteenth century metropolis had been tamed by a combination of science, medicine, and engineering."* In today's developing world, however, cholera continues to be a serious threat. Among the author's strongest points, indeed the book's greatest lesson, is that the challenges that Londoners faced in 1854 are much the same as those the developing world faces today. What can we learn? What can we apply in our search for new solutions? What does this tell us about how we can best prepare the next generation of scientists, scholars, doctors, urban planners, sociologists, legislators, entrepreneurs, and leaders?

The book also points to the rise of the megacities as both a challenge and an opportunity, with some surprises about the utility and even the environmental impact of metropolitan life. But this important discussion comes with a warning about the parallel rise of squatter cities which could, according to the author's projection, comprise as much as 25% of humanity in less than 20 years. How will we manage the infrastructure, public health and public safety needs for such developments? How can we capitalize on the innovation that arises from these communities, and enable them to elevate their quality of life?

"The megacities of the developing world are wrestling with the same problems of uncharted and potentially unsustainable growth that London faced 150 years ago. In 2015, the five largest cities on the planet will be Tokyo, Mumbai, Dhaka, Sao Paolo, and Delhi – all of them with populations above 20 million. The great preponderance of that growth will be driven by so-called squatter or shantytown developments – entire sprawling cities developed on illegally occupied land, without any traditional infrastructure or civic planning supporting their growth."

Across the globe today and largely in the developing world, the author points out, enormous numbers of people are at risk as a result of disparities in relative wealth and patterns in population distribution. Nearly three billion people (about half of the planet) do not possess basic sanitation services such as toilets and sewers. More than one billion people do not have access to potable water. And each year, two million children die from cholera and other diseases that result from these unsanitary conditions. The challenges and the opportunities here seem equally clear. How can this inform a university's thinking on curricula and degree programs? How can we challenge and inspire students to acquire the knowledge and skills to face these great challenges and create disruptive technologies, policies, resources, and thinking? Who will be the next Dean Kamen? Who will be the next Bill Gates? Who will be the next Snow and the next Whitehead?

On the Role of the Land Grant University

As an engineer, I found the elements of the book that focused on the role of energy especially interesting. Being part of a university with some of the most highly regarded academic and research programs in the environment, I suspect these sections were of particular interest to our new and returning students as well. Environmental programs have evolved considerably at universities in the last fifty years. The best universities are equally well regarded in areas of environmental science and engineering as they are in environmental policy and sustainability. We are preparing students not only to create and apply technologies to solve problems, but also to be able to assess the impact of their proposed solutions. We are seeing new programs emerge in eco-business, environmental law, sustainable cities, eco-tourism, and environmental design. And of course we are strengthening the programmatic connections in energy and the environment as fossil fuel resources are depleted and we must develop and employ new resources, new technologies, and new energy consumption/conservation strategies and behaviors.

Steven Johnson offers insight into current and future challenges, and what we can learn from the work of Snow and Whitehead in facing those challenges. Toward the end of the book, attention turns to pandemic

threat and bioterrorism, and the important roles that genetics, advanced computing, and public health institutions will play in combatting each. Johnson urges us to look beyond the challenges we face today and think about the challenges *and* the opportunities that will come next. But thinking about “the next big thing” (which at least one tech giant suggests is already here) often involves some risk and certainly requires us to think outside of our comfort zone. Yet disruptive technologies or business practices are rarely the result of incremental thinking and step-by-step strategy. Bold thinking empowers transformation.

“A decade or two from now, we may possess tools that will allow us to both analyze the genetic composition of a newly discovered bacterium and, using computer modeling, build an effective vaccine or antiviral drug in a matter of days. At that point, the primary issue will be production and delivery of the drugs. (The solution will lie in) the creation of public health institutions in the developing world – institutions that simply do not exist yet – along with a renewed commitment to public health in the developed world, particularly in the United States.”

In closing this section of the book and reflecting on the work of Snow and Whitehead as it applies to challenges we will face as cities continue to grow, Johnson offers direction that certainly resonates with the University of Vermont. In fact, one could easily infer that we are exceptionally well positioned as a university to take up these challenges. And certainly these recommendations align closely with our institutional mission and goals, our commitment as a land-grant university, and our academic strengths in arts and sciences, the environment, complex systems, human health, and public service.

“If we are to keep alive the model of sustainable metropolitan life that Snow and Whitehead helped make possible 150 years ago, (we must do) two things: The first is to embrace – as a matter of philosophy and public policy – the insights of science, in particular the fields that descend from the great Darwinian revolution that began only a matter of years after Snow’s death: genetics, evolutionary theory, environmental science. (...) The second is to commit ourselves anew to the kinds of public-health systems that developed in the wake of the Broad Street outbreak, both in the developed world and the developing: clean water supplies, sanitary waste-removal and recycling systems, early vaccination programs, disease detection and mapping programs.”

Closing Thoughts

Snow had a remarkable ability to *integrate* knowledge, *synthesize* new information and make new inferences, and *communicate* findings, ideas, and solutions to a broad audience. Snow’s work was not glamorous. It was not quick. It was not easy. To be certain, his was a great mind, but equally important was his unwavering dedication and his dogged determination to solve a problem, to make a difference, to change the world.

As I told our first-year students at Convocation this fall, “This is what the Grand Challenges will require of you: an ability to grasp complexity, think critically, integrate, synthesize, communicate and work very, very hard. Fortunately for you – and for us – you have come to the right place for that.”

As Steven Johnson urges in the last line of the book, “let’s get on with it.”

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