Notes from a Basically Applied Scientist

24 Jan 2012

Sanford Eigenbrode
Professor of Entomology
Host Plant Resistance to Insect Pests

Glandular trichomes on wild tomato spp.
Biological Control and Host Plant Breeding
Plant Phenotype and the Insect Community

Geocoris pallens

Nabis alternatus

Hippodamia convergens

Coccinella septempunctata

Aphidius ervi

Acyrthosiphon pisum

Pisum sativum

Northfield, Eigenbrode, Snyder 2012 (Ecology)
Plant Virus Infection and Vector Behavior

Illustration: Kerry Mauck
Basic and Applied

• Basic science (fundamental, pure) - motivated by curiosity

• Applied science - designed to answer specific questions (solve problems)
Socrates: Shall we set down astronomy among the subjects of study?

Glaucon: I think so, to know something about the seasons, the months and the years is of use for military purposes, as well as for agriculture and for navigation.

Socrates: It amuses me to see how afraid you are, lest the people should accuse you of recommending useless studies.

— Plato’s Republic
Applied

Basic

FEEDSTOCK MODEL
Collaboration and Integration

Legume Virus Project

REACCH
Regional Approaches to Climate Change – PACIFIC NORTHWEST AGRICULTURE

Toolbox

UI NSF-IGERT Projects

CRISSP
The need to solve societal problems

The inherent complexity of nature and society

The power of new technologies

The desire to explore new synthesis

— *Facilitating Interdisciplinary Research*, NAS, p. 40
Epistemology

I. Motivation

Core Question: Does the principal value of research stem from its applicability for solving problems?

1. The principal value of research stems from the potential application of the knowledge gained.
   
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<th>Agree</th>
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<td>1 2 3 4 5</td>
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2. Cross-disciplinary research is better suited to addressing applied questions than basic questions.
   
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3. My disciplinary research primarily addresses basic questions.
   
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The principal value of science is its application
(n = 60; mean = 3.75)
My research addresses basic questions
(n = 60; mean = 3.12)
Cross-disciplinary work is better suited to addressing applied questions (n = 120)
“...the network of relationships linking the human race to itself and to the rest of the biosphere is so complex that all aspects affect all others to an extraordinary degree.

...no gluing together of partial studies of a complex nonlinear system can give a good idea of the behavior of the whole.”

“The world of the quark has everything to do with a jaguar circling in the night.”
The Potential for Broader Integration

“Skepticism and wonder [are the]...the two uneasily cohabiting modes of thought that are central to the scientific method” –Carl Sagan

“Science is as much an inner path ... as it is a discipline aimed at accumulating knowledge of the physical world.” - J. W. von Goethe

Anschauung – wonder through looking
Phaedole humida

0.5mm

The Potential for Broader and Deeper Integration?

Are we at a stage where “we know very much, but understand very little”? (Manfred Max Neef 2005)

And can we address that through broader, more innovative collaborations?
The Potential for Broader and Deeper Integration?

Closer collaborations between sciences, humanities and the arts
The Potential for Broader and Deeper Integration?

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Inside Higher Ed, Jan. 2012
“All the spokes are needed.”