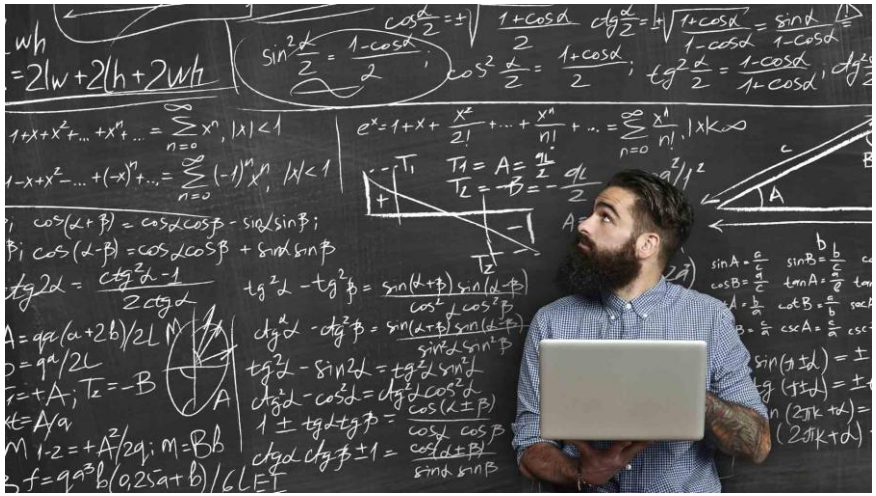
Often asserted, rarely measured: The **value of (re)integrating** humanities, STEM, and arts in undergraduate learning

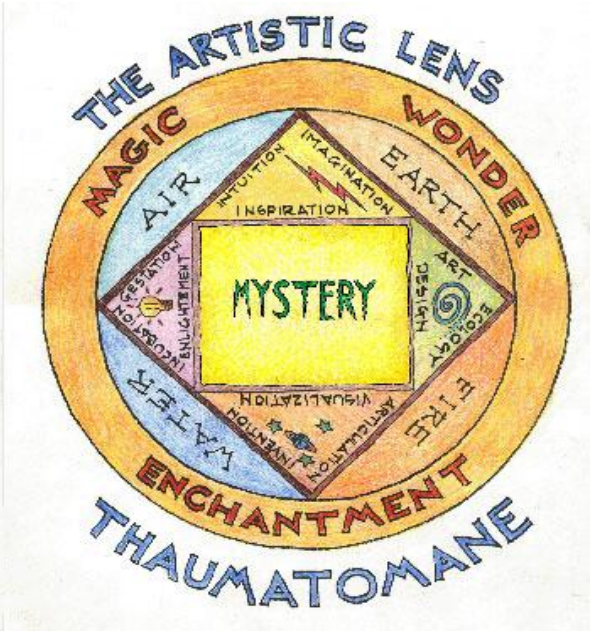
Hannah Stewart-Gambino
Government & Law, International Affairs
Jenn Stroud Rossmann
Mechanical Engineering

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

LAFAYETTE
COLLEGE

Research Question



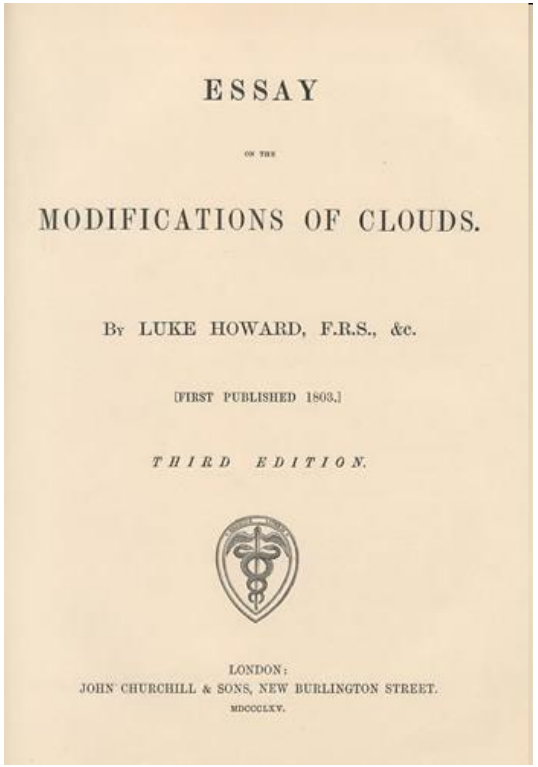


Overview

- Why does this matter?
- Can Hum/Arts strengthen STEM learning?
- Can STEM strengthen Hum/Arts learning?
- What about strengthening *each other*?
- Who benefits?
- Why don't we already do more of it?
- What should "we" do next?

What did we expect to find? Inspiration, antipathy, **(re)**integration?

After all, is this so new? **re**-integration



ESSAY

ON THE

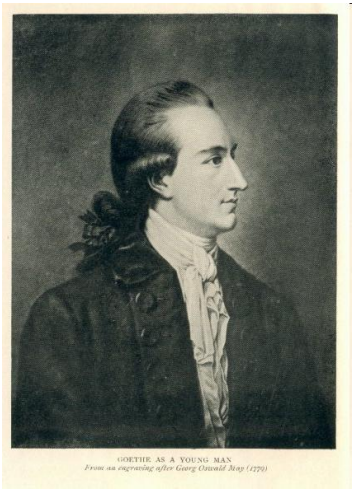
MODIFICATIONS OF CLOUDS.

By LUKE HOWARD, F.R.S., &c.

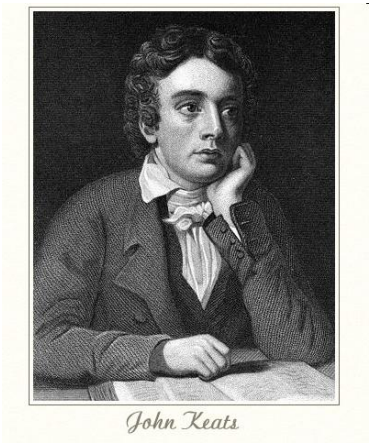
[FIRST PUBLISHED 1803.]

THIRD EDITION.

LONDON:
JOHN CHURCHILL & SONS, NEW BURLINGTON STREET.
MDCCCLXV.



GOETHE AS A YOUNG MAN
From an engraving after Georg Oswald Stap (1779)



Study of Clouds John Constable, 1822

Idealistic integration

LAFAYETTE

WORCESTER POLYTECHNIC INSTITUTE
LEHR UND KUNST
1865

Examples of Integration

and what motivates it

ABET

ASEE
AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Olin College

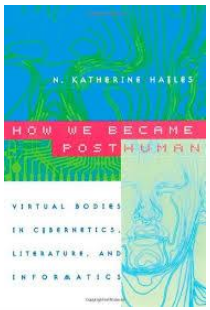
CAL POLY
SAN LUIS OBISPO

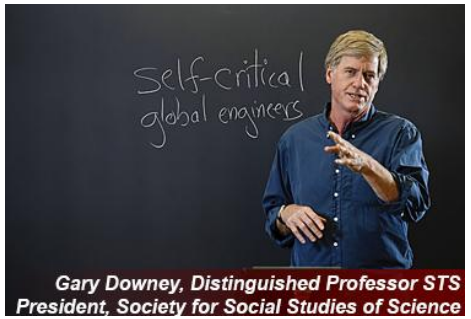
Liberal Arts and Engineering Studies

Freedom to Choose / Freedom to Create / Freedom to Travel

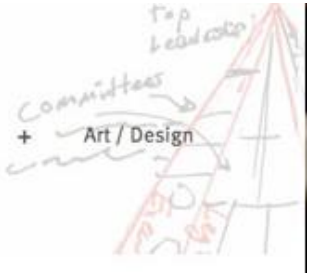
DEI SVB NVMINE VIGET

TERRASCOPE
YOUTH RADIO
MIT





Policy
Top down
S T E A M
Science
Technology
Engineering
Math

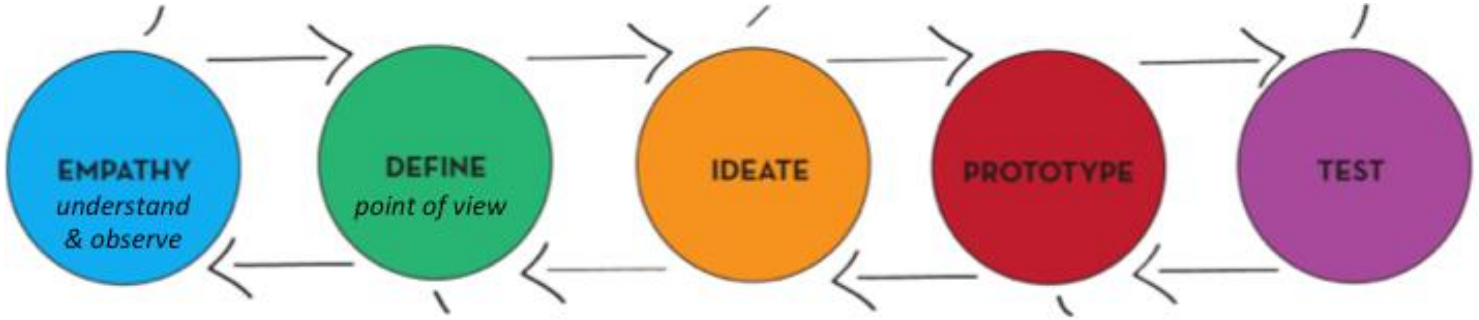


Humanities and the Arts

The whole point of the liberal arts education –
that fragile, extraordinary, valuable thing, which is
being put in your hands and has been put in your hands–
is to teach you to participate as full
partners in the making of the world around you.

Noah Feldman
2014

The promise of experiential, multidisciplinary design projects



- Understanding the needs of the user & stakeholders (developing **empathy**) as well as the context; social structure, institutions

- Defining the stakes of the project:
  - Constraints
  - Objectives

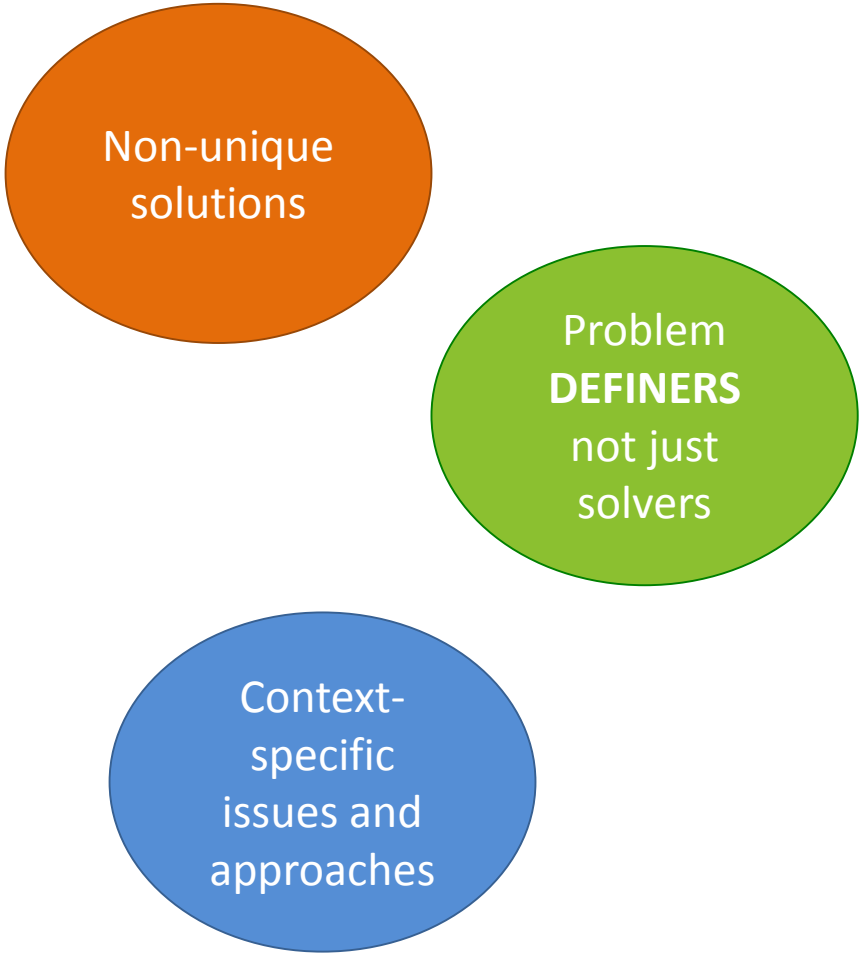
SCIENTIFIC AMERICAN™

Novel Finding: Reading Literary Fiction Improves Empathy

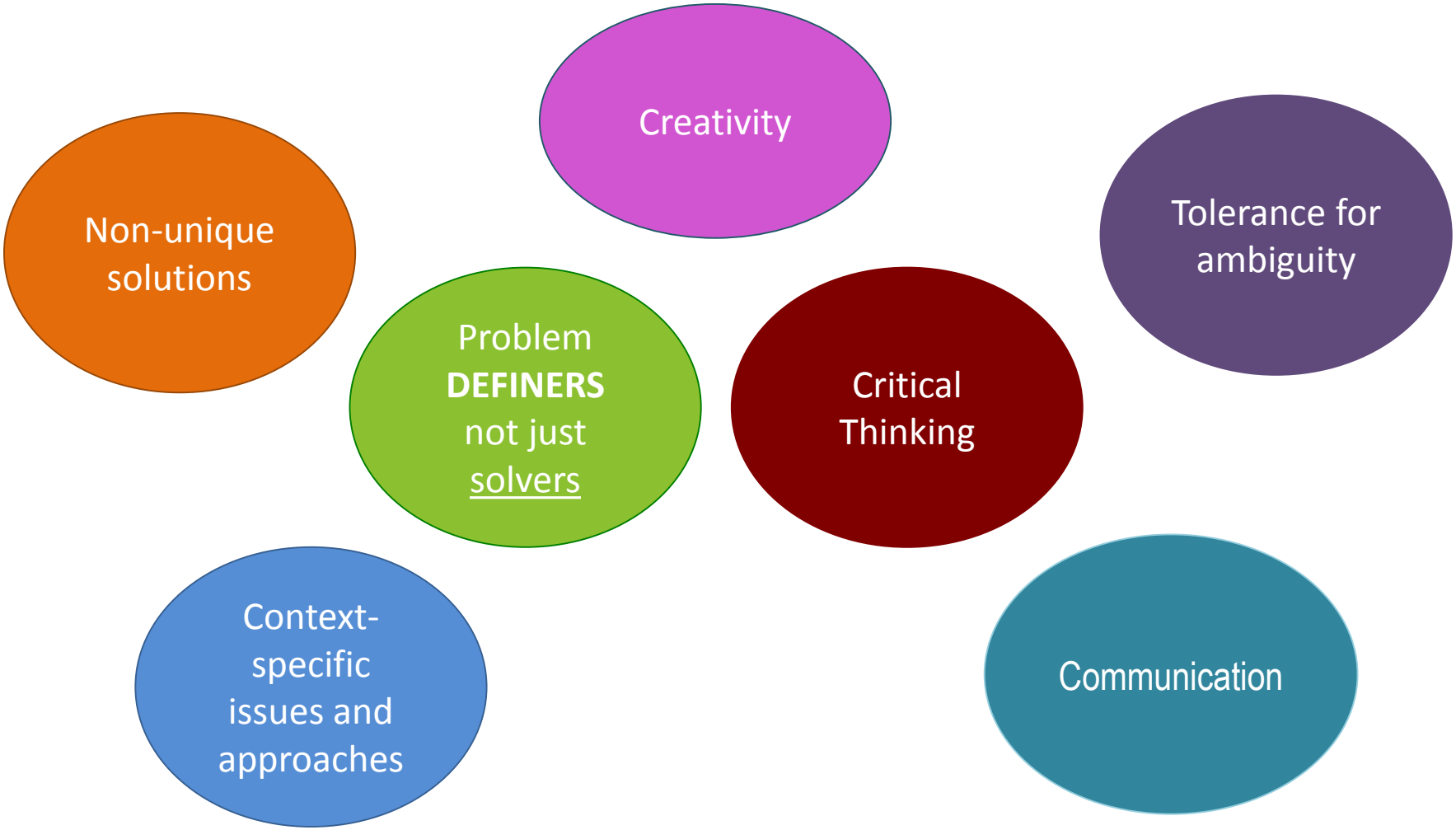
The types of books we read may affect how we relate to others

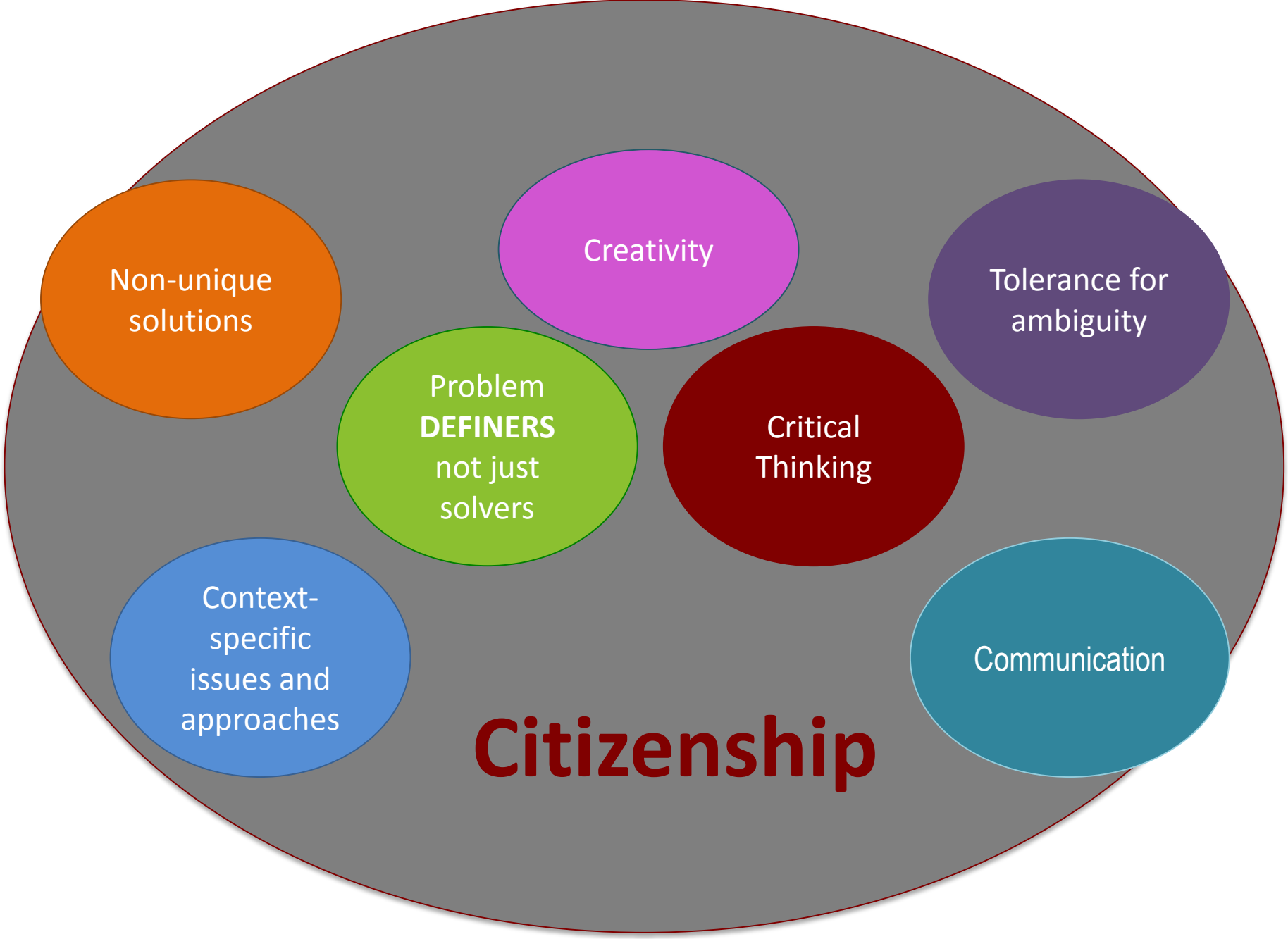
Expertise/content from social sciences and humanities relevant

Student outcomes



Everyone at the table




Non-unique solutions
Creativity
Tolerance for ambiguity
Problem **DEFINERS** not just solvers
Critical Thinking
Context-specific issues and approaches
Communication
Citizenship

Reciprocal benefits of (re)integration

STEM students

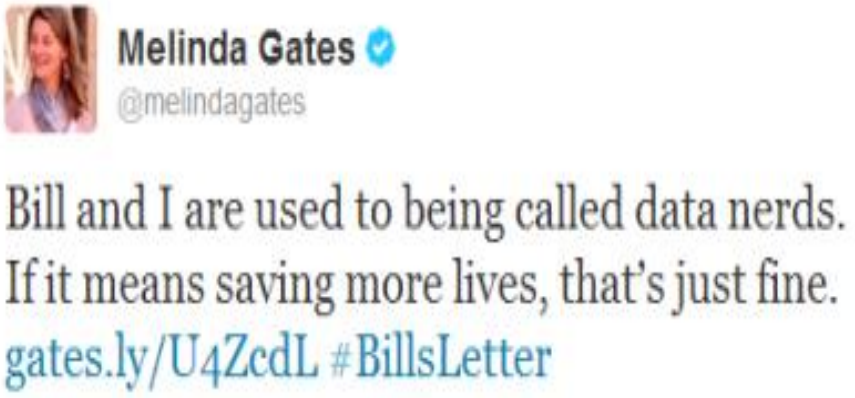
- **Grounded Citizenship**
  - *Socio-historical analysis*
  - *Analytical Rigor – texts, broadly defined*
  - *Values, Ethics*
  - *Team and leadership skills*
  - *Communication skills – written and oral*
- **Understanding of constraints in human/social worlds**
  - *Empathy*
- **Creativity**
- **Projects that can change the world for the better**

Humanities and Arts students

- **Grounded citizenship**
  - *Design Thinking: "How might we…"*
  - *Analytical Rigor – quantitative reasoning, broadly defined*
  - *Team and leadership skills*
  - *Communication Skills – visualization and presentation*
- **Understanding of constraints of physical and natural worlds**
  - *Empathy*
- **Creativity**
- **Projects that can change the world for the better**

Other benefits

Measurement and/versus accountability



So why did we ever **dis**-integrate?

Rene Descartes, 1596-1650

So why did we ever **dis**-integrate?

Rene Descartes, 1596-

The New York Times.

LATE CITY EDITION

SOVIET FIRES EARTH SATELLITE INTO SPACE;
IT IS CIRCLING THE GLOBE AT 18,000 M. P. H.;
SPHERE TRACKED IN 4 CROSSINGS OVER U. S.

HOFFA IS ELECTED TEAMSTERS HEAD; WARNS OF BATTLE

COURSE RECORDED

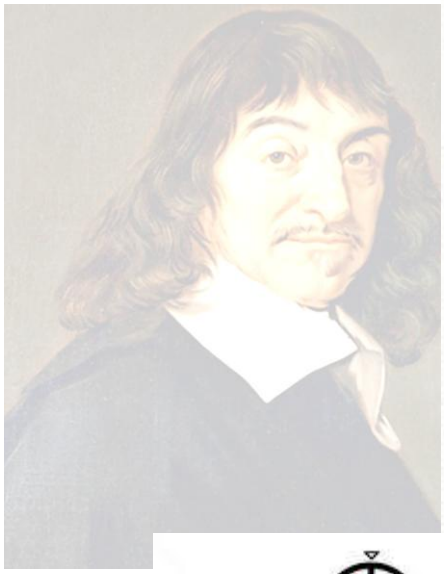
Navy Picks Up Radio Signals—Report Tracking Device

Device Is 8 Times Heavier Than One Planned by U.S.

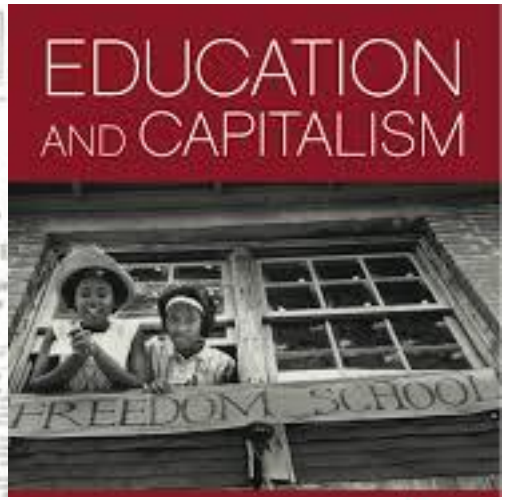
FAUBUS COMPARES

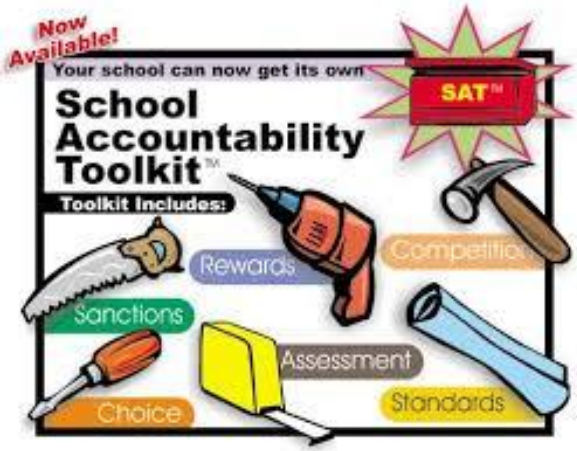
ARGENTINA TAKES

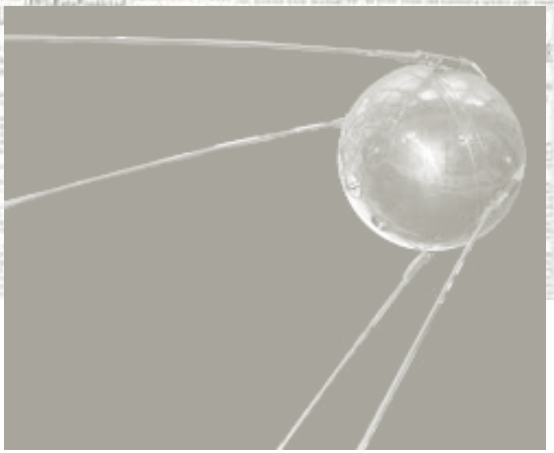
So why did we ever **dis**-integrate?



Rene D







How can integration be sustained and nurtured?

Vision and support

- Institutional Leadership
- Networks of colleagues
- Funding agencies
- Employers
- Political leaders

Obstacles

- Faculty reward structures
- Misplaced resource competition
- Measurement instead of accountability
- Administrator reward structures