



The VERITIES Initiative: Virtue-based Education for Responsibility & Integrity To Increase Excellence in STEM

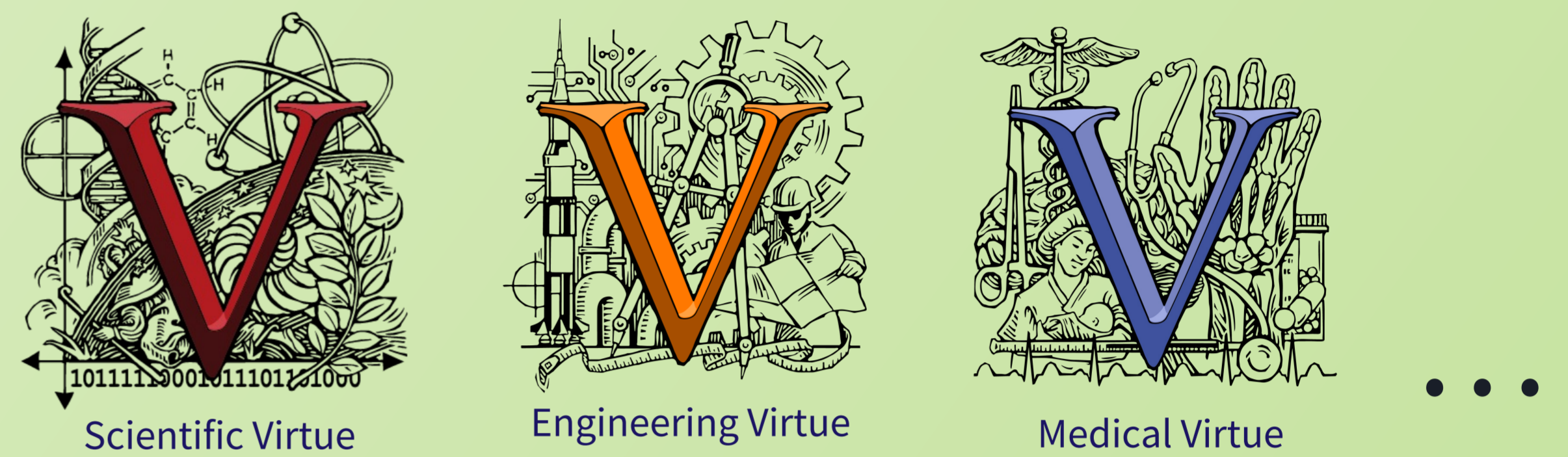
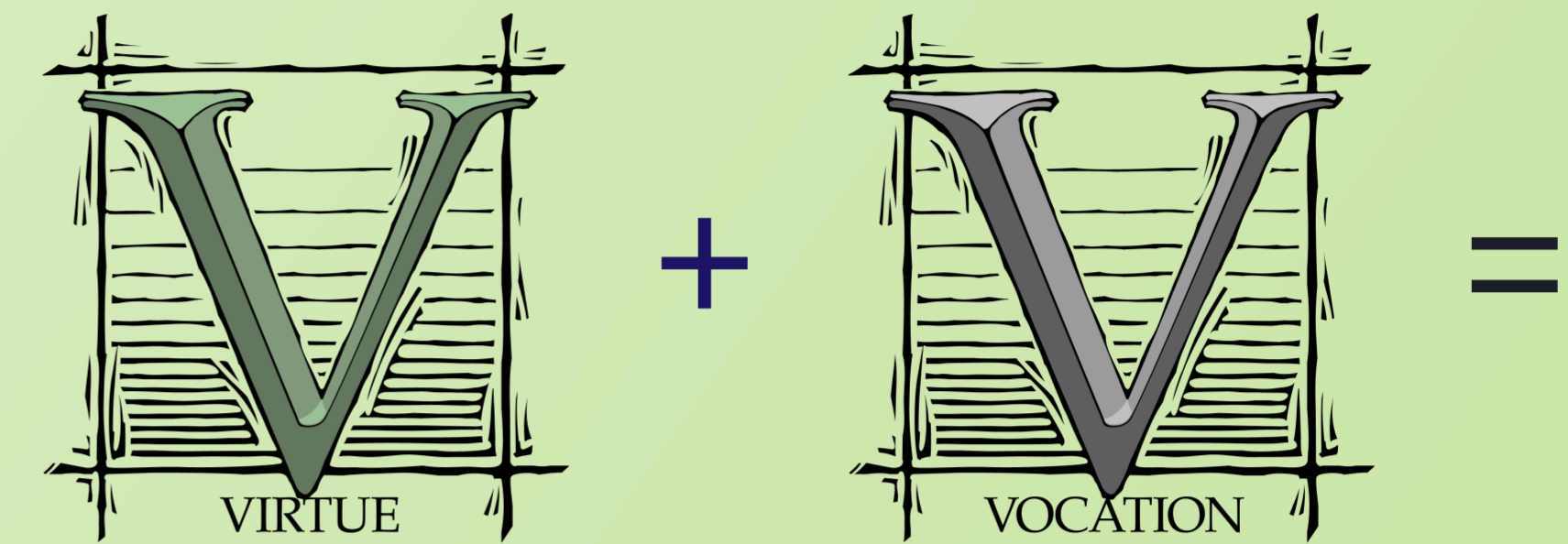
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<https://veritiesinitiative.msu.edu>

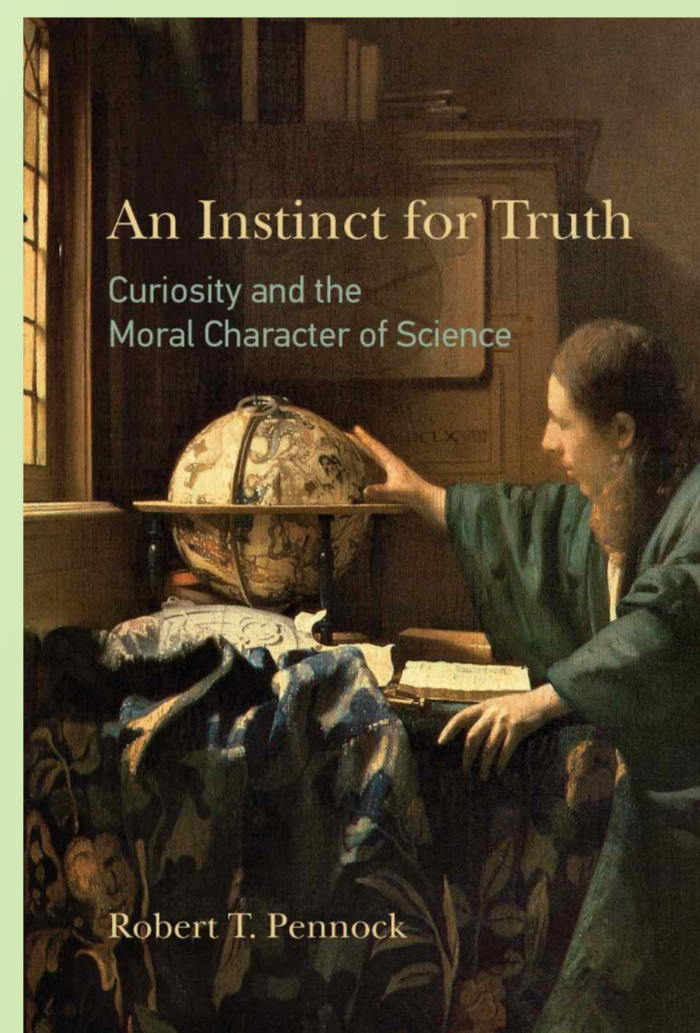
Background

VERITIES is an NSF-supported institutional transformation initiative at Michigan State University that aims to foster a culture of excellence and integrity in university and professional settings by infusing traditional Responsible Conduct of Research (RCR) training with an appreciation and understanding of the scientific virtues. It builds upon the vocational virtue-based RCR training workshop approach developed and tested by a collaboration between the *Scientific Virtues Project* and the *Toolbox Dialogue Initiative* starting in 2013 as part of BEACON, an NSF Science and Technology Center. Through discussion-based RCR training workshops for graduate students and faculty, VERITIES aims to help STEM researchers to think about the ethical dimensions of scientific practice by supplementing RCR training using a scientific virtue framework.



Vocational Virtue Theory

- Vocational virtues are the special dispositions of the mind for disciplined practices
 - e.g. The scientific mindset
- Vocational *telos*
 - e.g. Discovering truths about the natural world
- Vocational Flourishing
 - e.g. a flourishing research culture
- Vocational Virtues
 - e.g. scientific virtues



Workshop Feedback

“Scientific Virtues ... [are] an innovative, promising way to train researchers in the responsible conduct of scientific research. This approach promises to be a significant improvement over current RCR training methods.” -- *BEACON NSF Site Visit Report 2018*

“The exercise was much more motivating than traditional RCR. It made me want to be a better scientist immediately.” -- *SV Toolbox Participant*

“These exercises inspire me to be an ideal scientist instead of making me worry about what not to do wrong.” -- *SV Toolbox Participant*

“I like the dialogue of the [Scientific Virtues] approach, as well as the emphasis on the positive (values) versus the negative (what not to do).” -- *SV Toolbox Participant*

Empirical Support

- Population: Random sample of ‘senior’ exemplary scientists & ‘junior’ early career scientist
- N = 1100 scientists (S: 605; J: 514)
- 4 years data collection
- Phone interviews (or online or paper survey)
- Quantitative & qualitative data
- 500 hours of interviews transcribed and coded

The Scientist's Telos

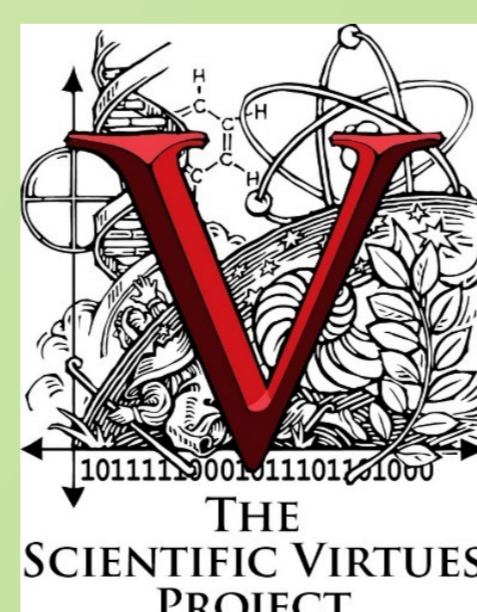
“In two sentences I think probably the central guiding purpose for a scientist on a personal level is one of trying to further human understanding of some phenomenon. Then I think ancillary to that, you would hope that that process would also lead you to something that actually helps society. I think there's a balance between those two things.”

“It goes back to this innate curiosity and this desire to understand some phenomenon on a deeper level to contribute to human understanding. Then aside from that hopefully have some positive benefit on your fellow man.”

| Scientific Virtues Toolbox RCR Workshops | | | |
|---|--------|----------|----------|
| # of Participants | 128 | (118*) | |
| # of Survey Respondents | 79 | (73*) | |
| Response Rate | 61.7% | (61.9%*) | |
| QUESTION | Agree | Neutral | Disagree |
| ...I enjoyed the Scientific Virtues Toolbox workshop | 88.6% | 10.1% | 1.3% |
| ...the [workshop's] prompts were effective conversation starters | 94.9% | 3.8% | 1.3% |
| ...[the workshop discussion] was an open exchange of ideas and ideas | 87.3% | 8.9% | 1.3% |
| [Since completing the workshop] I have thought about the topics | 61.6%* | 20.5%* | 17.8%* |
| [Since completing the workshop] I have discussed the topics with others | 49.4% | 25.3% | 25.3% |
| ... contributed to a change in my views of scientific [focal virtue] | 28.8%* | 30.1%* | 41.1%* |

Guided-Discussion Workshops

- Scientific Virtues Toolbox**
 - Small groups, lightly moderated, free-flowing
 - Discussion prompts crafted to elicit reflection around the role of a particular virtue in science
 - 90-minute workshop / module



- Modules**
 - Purpose of Science
 - Curiosity
 - Honesty
 - Courage
 - Humility to Evidence
 - Perseverance
 - Attentiveness
 - Objectivity
 - Skepticism
 - Meticulousness



Scientific Virtues Toolbox workshop

• 10 modules
• >75 workshops
• >1000 participants

Publications

- Pennock, Robert T. “The Call of Science” *American Scientist* (2024, Vol. 112 No. 02, p. 92-95)
- McLeskey, Chet, Eric Berling, Michael O'Rourke, and Robert T. Pennock. “The Evolution of the Scientific Virtues Toolbox Approach to Responsible Conduct of Research Training” in *Evolution in Action: Past, Present, and Future*, ed. Wolfgang Bhanzanf et al. New York: Springer Publishing (2020, pp. 353-550)
- Pennock, Robert T. *An Instinct for Truth: Curiosity and the Moral Character of Science*. The MIT Press (2019)
- Berling, Eric, Chet McLeskey, Michael O'Rourke, and Robert T. Pennock. “A New Method for a Virtue-Based Responsible Conduct of Research Curriculum: Pilot Test Results.” *Science & Engineering Ethics* (2018, <https://doi.org/10.1007/s11948-017-9991-2>)
- Pennock, Robert T. “Beyond Research Ethics: How scientific virtue theory reframes and extends responsible conduct of research.” In Carr, David (ed.) *Cultivating Moral Character and Virtue in Professional Practices*. Routledge Press. (2018, pp. 166-177)
- Pennock, Robert T. and Michael O'Rourke. “Developing a Scientific Virtue-Based Approach to Science Ethics Training.” *Science & Engineering Ethics* (2017, 23(1):243-262)
- Pennock, Robert T. “Fostering a Culture of Scientific Integrity: Legalistic vs. Scientific Virtue-Based Approaches.” *Professional Ethics Report* (2015, 28(2):1-3)
- Pennock, Robert T. “Following Humbly where Nature Leads: How Scientists Embody Humility.” *Slate*. Essays and Opinions. (Aug. 10, 2015)

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