Humboldt State University

A Metadisciplinary Approach to Assessment and Redesign of a General Education Program

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ABSTRACT. Metadisciplines are groups of disciplines that hold in common an overarching framework of reasoning/way of knowing that unites them. For example, philosophy, languages, literature, religion, communication, and history hold in common the overarching way of knowing/framework of reasoning of the humanities. We have recognized six metadisciplines: arts, humanities, mathematics, science, social science, and technology. In faculty forums, the signature trait that faculty aspire for students to achieve is higher level reasoning skill rather than more content knowledge or disciplinary skill. Teaching students the framework of reasoning/way of knowing of the metadiscipline and giving students experience in employing it is a way to give students practice in developing reasoning across the curriculum. Students do not automatically acquire higher level reasoning through acquiring content and skills. We recognize that acquiring content and skills are necessary for students to use in developing higher level reasoning. We give attention to the institutional mission, the learning outcomes and competencies expected by stakeholders such as systems, states and regional accrediting agencies in achieving content and skill. Nevertheless, it seems necessary to make reasoning explicit and chances to develop it frequent across entire curricula.

INTRODUCTION. Our Humboldt State University (HSU) team consists of faculty members of the General Education and All-university Requirements Committee (GEAR) and the Director of Educational Effectiveness, who is also a geologist. GEAR was first tasked with developing an assessment plan for HSU's General Education curriculum. When the Director of Educational Effectiveness (DoEE) joined us for our first workshop in August of 2012, he introduced GEAR and workshop participants to a novel metadisciplinary approach to assessment of science literacy that started in 2008 with a general education science course grant from CSU's Office of the Chancellor to ten California State University (CSU) science faculty from four CSU campuses. HSU's present DoEE was the lead investigator. Thus metadisciplinarity is an approach to assessment and instruction of general education in science that began in the CSU. That team went on to develop an assessment instrument, Science Literacy Concept Inventory (SLCI) that has now been tested on over 6000 students. Thereafter DoEE began to interview practitioners of other metadisciplines as a way to articulate metadisciplinary outcomes in these other large general education areas. Results of these interviews have been published in recent issues of National Teaching and Learning Forum.

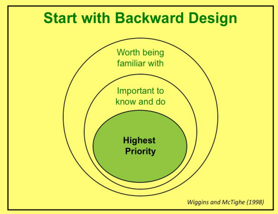
HSU faculty participants in the Arts at the August Workshop looked at science's metadisciplinary concepts and outcomes and asked for work time to consider drafting metadisciplinary outcomes for the Arts. In about a half an hour, they had developed a short list of assessable metadisciplinary outcomes for the Arts. The GEAR committee then decided to work on creating assessable metadisciplinary outcomes across the major areas of traditional liberal/general education studies. GEAR met weekly for the academic year 2012-13, obtained a small grant from the CSU Chancellor and did several presentations for colleges and the Academic Senate. By January, 2013, the Senate asked GEAR to expand its mission to submit a plan for redesign of General Education.

Currently, GEAR is refining the metadisciplinary outcomes, developing assessment instruments and making use of the AACU LEAP rubrics. Here in Vermont, we hope to develop an initial draft plan for Academic Senate, consider an integrated capstone course for general education, and obtain ideas, critiques and suggestions from peers and mentors. If successful, we believe we will be the first institution to use metadisciplinary outcomes as a way to develop higher level reasoning skills through the undergraduate experience as well as integration of general education with major programs. In fall, we will direct our focus onto a first-year-experience course to prepare students for learning, to understand the nature of becoming educated and to prepare them to take advantage of the university experience.

PROCESS EMPLOYED TO DATE

Our process is a simple four step one:

1. Employ backwards design to determine the larger scale goals.
2. Articulate the central concepts of the metadiscipline.
3. Restate these as assessable student learning outcomes.
4. Develop suitable assessment instruments that contribute to both achieving and assessing the outcomes.



Backwards design is useful at scales from lesson design through degrees. The SLCI group started with determining the goal of general education science courses as understanding science's way of knowing. The GEAR group held open forums and had faculty address the most desirable attributes in degreed graduates. The consensus of both was a desire to strengthen the ability of students to think and reason.

EXAMPLES OF STUDENT LEARNING OUTCOMES FOR SIX METADISCIPLINES

DRAFT: Metadisciplinary Outcomes for the Arts

Students should be able to…

1. Explain the significance of creative expression and art to the human experience.
2. Discern objective vs. subjective scholarship, criticism and analysis of the arts.
3. Articulate in his/her own words a definition for what constitutes the arts.
4. Communicate ideas and emotions through the practice and study of the arts.
5. Recognize and value creative expression from various cultural and historical perspectives.
6. Explain in his/her own words reasons why critical thinking and problem solving have value in the arts.
7. Describe, using at least two specific examples, how art literacy is important in everyday life.

DRAFT: Metadisciplinary Outcomes for Humanities

Students will be able to…

1. Communicate issues orally and in writing through providing the relevant information needed for clear understanding to an intended audience.
2. Construct a clear analysis or synthesis of an argument based on conflicting evidence furnished by high quality information sources.
3. Present an evidence-based argument that shows recognition of the relevance of context in making a decision.
4. Present an evidence-based argument that shows recognition of the validity of multiple conflicted viewpoints.
5. Render conclusions and decisions based on consideration of multiple perspectives and prioritization of available evidence.
6. Render conclusions/decisions to appropriate problems by applying the major concepts of an ethical framework of reasoning.
7. Explain the value to self that arises from acquiring the ability to use the frameworks of logic and ethical reasoning developed in the humanities.

Metadisciplinary Outcomes for Science Literacy

Students will be able to…

1. Identify the domain of science and determine whether a statement constitutes a hypothesis that can be resolved within that domain.
2. Describe through example how science literacy is important in everyday life to an educated person.
3. Explain why the attribute of doubt has value in science.
4. Explain how scientists select which among several competing working hypotheses best explains a physical phenomenon.
5. Explain how "theory" as used and understood in science differs from "theory "as commonly used and understood by the general public.
6. Explain why peer review generally improves our quality of knowing within science.
7. Explain how science employs the method of reproducible experiments to understand and explain the physical world.
8. Articulate how science's way of knowing rests on some assumptions.
9. Distinguish between science and technology by examples of how these employ different frameworks of reasoning.
10. Cite a single major theory from one of the science disciplines and explain its historical development.
11. Explain and provide an example of how modeling is used in science.
12. Explain why ethical decision-making becomes increasingly important to a society as it becomes increasingly advanced in science.

DRAFT: Metadisciplinary Outcomes for Social Science

Students should be able to…

1. explain the development of social and historical issues and problems.
2. critically analyze texts dealing with historical and contemporary problems and issues.
3. access sources and materials applicable to their own research within their discipline.
4. utilize appropriate sources to conduct their own analysis of social, historical, political, economic issues.
5. communicate effectively in written and oral form with regard to social and historical issues.
6. incorporate a consideration of culture and individual differences (including positions of privilege and power) in shaping social and historical experiences.
7. explain major theories that have shaped the interpretation of social and historical problems.

DRAFT: Metadisciplinary Outcomes for Quantitative Literacy

A quantitatively literate college graduate should be able to…

1. Interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them.
2. Represent mathematical information symbolically, visually, numerically, and verbally.
3. Use arithmetical, algebraic, geometric and statistical methods to solve problems.
4. Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.
5. Recognize that mathematical and statistical methods have limits.

(From http://www.maa.org/past/ql/ql_toc.html, 1994. Used - with minor modifications in subsequent national discussions about quantitative reasoning.) .

DRAFT: Metadisciplinary Concepts for Technology

Students will be able to…

1. Provide case examples of creative and critical thinking as employed in an actual application of the technological framework of reasoning.
2. Explain the role of ethics in the practice of technology's professions.
3. Explain some approaches that technology experts can employ to increase successful communication with their clients and with laypersons.
4. Explain how technology's framework of reasoning differs from that of science or the arts.
5. Explain why development of professional competency in the technology professions commonly requires extended periods of mentoring.
6. Explain how expert practitioners of technology develop "informed affective domains" that enable effective utilization of knowledge and skills guided by nonverbal intuition.

METADISCIPLINARITY'S RELATIONSHIPS TO HIGHER LEVEL REASONING

Traditions of Critical Thinking and Metadisciplinarity

- Traditions (Brookfield, 2012)
  - Logic and philosophy
  - Science
  - Pragmatism
  - Psychoanalysis
  - Critical theory
- Metadisciplines
  - Humanities
  - Science
  - All metadisciplines
  - Social science
  - Social science, humanities

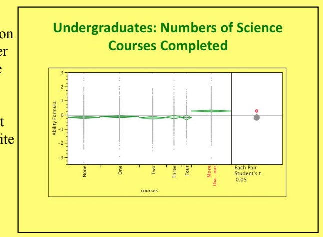
— Creative thinking, deemphasized in traditional critical thinking, is emphasized in the metadisciplines of the Arts and Technology.

Stephen Brookfield's *Teaching for Critical Thinking: Tools and Techniques to Help Students Question Their Assumptions* lists five "traditions" for teaching critical thinking. Each in itself seemed incomplete to us as a model for teaching higher level reasoning through a general education curriculum. However, each tradition derives from one or more metadisciplines, we can contribute all of the "traditions to our GE by employing metadisciplinarity.

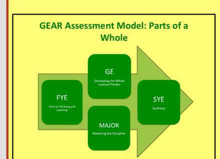
DEVELOPING SUITABLE ASSESSMENT INSTRUMENTS

Assessment instruments should produce reliable valid assessment measures but also help to convey what is important to teach and learn and how both contribute to the larger goals articulated during backwards design. We have initially selected a concept inventory for science literacy (SLCI) and rubrics for mentoring students to higher levels of reasoning metadisciplinary through a process that includes development of awareness about ways of knowing and frameworks of reasoning.

Early work with the SLCI confirmed that general education courses in science do not confer increased awareness of science as a way of knowing. General education courses are used to convey knowledge and skills at the expense of reasoning, despite what college catalogs claim as general education outcomes. Closing the loop may require emphasizing reasoning throughout the GE curriculum.



CURRENT VISION UNDER DEVELOPMENT



In this workshop, we focus on polishing the meta-disciplinary outcomes and rubrics designed to promote instruction and assessment through signature assignments. We also hope to lay the groundwork for a synthesizing capstone experience (SYE) that integrates two or more frameworks of reasoning for addressing a complex open-ended "wicked problem." To the extent possible, GE should focus on developing both ability to reason and respect for diverse ways of knowing, with content and skills relegated largely to the major disciplines.

We increasingly realize that complete success depends on using our GE program for backwards design of a new first year (FYE) experience that introduces students to learning augmented by metacognitive awareness of how to learn, how to become a reflective, self-regulated learner, the nature of higher-level thinking, the frameworks of reasoning that they will be developing in general education and their major and the real purpose of general education. We will concentrate on the FYE in Fall, 2013.