

Motivation, Identity, and Informal Science

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How strong is the research base and what are the appropriate applications to understanding non-school learning, both incidental and designed?

- “strong” and “appropriate” can have different meanings, as can motivation, identity, and learning
- the research base in motivation has a long history, focused on the motivation to achieve (see Eccles, Wigfield, & Schiefele, 1998)
- distinction in German literature between motivation that builds on ability and motivation that builds on volition, or will

n Motivation- typically identified as in the person

Goal setting

Achievement motivation: performance or mastery orientation

Self-efficacy

Self-regulation/self-direction

Effort

Sense of possible selves

Identity, self-representation

Interest- typically identified as existing in the interaction between the person or group and the environment

n Identity or self-representation

- How people are identified by others
- Characterized by age-and gender-related concerns (Todt & Schreiber, 1998)
- In developed form, can be closely linked to well-developed individual interest

- Motivation and identity are sometimes considered dichotomous, or they are described as phases or stages in a process of developing skills and understanding.
- Motivational variables and identity can be considered mediators or described as an outcomes of development-- and, this is dependent on where in the process of development the question is posed.

n *How are questions about learning framed in this line of research?*

Learning most typically described in terms of achievement; but may be described in terms of meaning making, participation, literacy, and/or in terms of the development of scientific (or mathematical) thinking: science-as-theory change, science-as-practice, and science-as-logical reasoning (Lehrer & Schauble, 2006, see also Schoenfeld, 1992)

- fine grain analysis describing connections, strategies, and self-regulation or autonomy
- large grain analysis gauging student achievement

- n *What outcome measures and/or research methods are typically used (design, techniques, unit of analysis, setting)?*
- Controlled experimentation, using outcomes based on surveys has been a norm for studies in motivation;
- The focus has typically been on whether motivation increases and is associated with achievement, not whether (and how) learning develops, or occurs.

n *What is unique to learning of STEM?*

- Can be intrinsically interesting to learners (Gelman & Brenneman, 1994)
- Connections to an understanding that what is being learned is “science” (Renninger, et. al., in preparation)
- May be collaborative in ways that class work in the same content is not, e.g., working with nonroutine challenge problems using online white boards (Concert Chat) with students around the world (Stahl, et. al., 2006)

- n Consideration of Motivation, Identity and Learning in informal science is likely to require understanding:
 - Expectations for participation: e.g. familiarity and fun, development of scientific literacy and thinking/mathematical thinking, problem solving, and so forth
 - Age-related, and experience-related development
 - Change over time,
 - Context, culture
 - Unit of analysis, individual and/or group
 - Methods employed, e.g., ethnography, interviews

- Studies in informal settings increasingly either include motivational variables or attribute findings to motivation; typically, they do not build on research in motivation.
- Research in motivation requires some background knowledge, may be useful to informal science especially if quality of task engagement is of interest
 - Everyday usage, not always precise enough
 - Context/content differences (focus is often on participation, not necessarily what is gained/learned through participation)

- For example, research in reading on the seductive detail effect (c.f., Gillingham, & White, 1989). This research has implications for the study of distraction, whether this is in the robotics program, work with an online nonroutine challenge problem, or science inquiry in an out-of-school program. It has not been cited in the informal science literature.
- Understanding distraction, and also how and whether the triggering of interest informs learning is a critical question (Lepper & Henderlong, 2000).

n *What is unique about learning in nonschool settings?*

- Time frame- opportunity to follow passion
(Collins, 2006)
- Often includes community and alternative participant structures (Heath & Roach, 1989; Steinberg, 1998)
- Allows targeted content-informed scaffolding, especially in the online environment (Renninger, Luft, Ray, & Newton, 2006).

- Can allow for choice of time, place and readiness, especially in the online environment (Barab, 2004)
- Requires apprenticeship or external support to begin; and both curiosity questions and self-regulation to persevere (Renninger & Hidi, 2002)

- 3 phases of research
 - Descriptive, to identify indicators (e.g., case studies, in-depth interviews, fine-grain analysis of artifacts)
 - Hypothesis generation, building an inductive model based on description
 - Hypothesis testing, using controlled experimentation to test hypotheses

