Responding to Administrative Priorities

Implications of Perceiving Intelligence As Either Fixed or Malleable

***Capsule*:** Holding a belief that intelligence is either fixed or malleable has an impact on behavior and performance; the latter is more likely to lead to behavior patterns supportive of achievement. Articles representative of the research on this topic are reviewed and implications of their results discussed.

***Summary*:** Dweck (1986) proposes a social-cognitive approach to the analysis of motivation, (Achievement) Goal Orientation Theory. In this theory, a person's motivation to achieve is driven initially by his/her perception of intelligence as either fixed or malleable; this perception in turn affects goal orientation. The combined effects of goal orientation and level of confidence in present abilities lead to either an adaptive or maladaptive pattern of behavior with respect to (non)attainment of goals. The following table, adapted from Dweck (1986, p. 1041) provides a high-level overview of the theory. A performance orientation, rooted in the perception that intelligence is fixed, can ultimately be a demotivating factor resulting in fewer opportunities for intellectual growth.

Achievement Goals and Achievement Behavior

Theory of Intelligence	Goal Orientation	Confidence in Present Ability	Behavior Pattern
Entity Theory (Intelligence is fixed)	Performance (Gain/avoid judgments of competence)	High	Mastery oriented (seek challenges) (high persistence)
		Low	Helpless (avoid challenges) (low persistence)
Incremental Theory (Intelligence is malleable)	Learning/Mastery (Increase competence)	High **OR** Low	Mastery oriented (seek challenges) (high persistence)

after Dweck (1986, p. 1041)

Research questions with respect to (Achievement) Goal Orientation Theory include:

Can an unproductive perception regarding the nature of intelligence be changed? This question has been addressed by various studies. Representative are Aronson, Fried, and Good (2002) and Blackwell, Trzesniewski, and Dweck (2007), which investigate the impact of short-term interventions to teach subjects that intelligence is malleable. Aronson, Fried, and Good worked with undergraduates in California; and Blackwell, Trzesniewski, and Dweck worked with seventh graders in public junior high schools in New York City. In both instances, treatment groups which received the message that intelligence is malleable outperformed control groups on academic activities.

Can the malleability message stand on its own, or can its effect be augmented by combining it with another? Good, Aronson, and Inzlict (2003) report the result of interventions conducted with seventh graders. Treatment groups received one or both of the following messages from their college-age mentors: intelligence is malleable; and academic difficulties often happen when adjusting to a new school – but don't worry, you'll bounce back.

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Students receiving both messages did not perform significantly better than students receiving only one of the messages, indicating no additive effect. As in the studies cited above, students in treatment groups performed significantly better than those in the control group.

How can the malleability message be transmitted? Dweck (2002) reports the role of types of praise has in reinforcing beliefs about the nature of intelligence, determined through a series of studies with grade school students. Praise that focuses on innate abilities ("how smart you are!") reinforces the notion that intelligence is fixed; praise that focuses on effort ("how hard you've worked!") reinforces the notion that intelligence is malleable.

Additional resources include Dweck (2006) and Kaplan and Maehr (2007). A related CASEE report is Donohue (2009).

***Implications for Engineering Education*:** Administrators have opportunities to lead promotion of student acceptance of the malleability of intelligence and faculty use of appropriate praise in pre-college and undergraduate classrooms. Such efforts could be expected to enhance student preparation for college, increase interest and enrollment in undergraduate and graduate engineering programs, and lay the foundation for career success. While such interventions appear to benefit recipients from all backgrounds, a common finding of the research cited here is that they seem to be particularly effective for students from underrepresented populations in science, technology, engineering, and mathematics (STEM).

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Prepared by: Susan K. Donohue, Ph.D., EEES Postdoctoral Engineering Education Researcher, Center for the Advancement of Scholarship on Engineering Education, February 2009.