**Engagement vs Motivation: Creating and Sustaining Learning in STEM**

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CU-Boulder has a strong and affirming commitment to inclusive education, but tools are needed to advance our understanding of the relation of the learner to the learning environment.  A shift in paradigm away from one of *individual motivation* towards one of *engagement in a learning environment* can support our campus goals.

Motivation derives from the Latin word *motivus*, or a moving cause, and describes the impetus or force behind individual action[1]. As an internal property of individuals, motivation is something that guides or directs our activity in the world. As an external force, motivation is induced in other people to incite or shift a change in thinking or behavior. This notion that we possess an inner force that drives our goals, actions and even unconscious desires is rooted in many cultures and religions. In the context of education, we have the tendency to make sense of the behavior of students in terms of what they are "motivated" or "lack the motivation" to do. Countless motivational techniques have been devised to get children to stay focused, to persist through challenges, and to act responsibly and respectfully. We regard students who display these behaviors as "motivated to learn"[2] or to do well in school, while those who do not are "unmotivated" or "uninterested" in school.

While the concept of motivation has played an important role in explicating the actions of others in terms of beliefs, values, goals, desire, etc., it has also done our students a disservice. Interpreting what individuals do solely in terms of a force within them ignores the myriad factors that contribute to what we are observing. Because we tend to perceive students as motivated (or not) towards schooling, and motivation itself as a personal state of being, we attempt to bring about changes in the state of the student. In other words, it is up to the instructor to try to "motivate" the student towards certain interests, beliefs, values and goals that lead to good choices. Viewing the relation between the student, teacher and the environment in this way has three consequences.

First, it locates the source of the student's power to act as entirely under their control. In other words, the student is capable of behaving in an appropriate way, should he or she will it. Most of us do not believe this to be the case. However, this assumption is inherent in a motivation-based orientation towards learning. This is particularly true when a student (or group of students) is less successful than the majority of students in a classroom or program. The tendency then, is to lay blame for these special cases of behavior at the feet of the students.

A second consequence of the overreliance on a motivation paradigm is that category systems are more likely to get organized around student behavior. In general, we tend to categorize people,

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[1] "motivation." *Merriam-Webster.com.* 2018. https://www.merriam-webster.com (10 January 2018).

[2] Ames, C. (1992). Classrooms - Goals, Structures, and Student Motivation. *Journal of Educational Psychology, 84*(3), 261-271. Doi 10.1037//0022-0663.84.3.261

things and experiences when we can draw simple distinctions between them. Round/square, hot/cold, clear/cloudy, motivated/unmotivated are all distinctions we make on a daily basis, that enable us to make quick judgements. The simple categorization of students in terms of their behavior, and thus, motivational orientation, however, can have damaging consequences for students' identities in the long run. Ground breaking research on students' beliefs about intelligence, or their *mindset*, has shown that students tend to view themselves as a person who "is" or "is not" a math person, based on their fixed level of intelligence.[3] Students' perceptions of intelligence as "fixed" or "developing and malleable" had a significant effect on their mathematical persistence. Similarly, when motivation to learn is viewed as a quality that students do or do not have, this quality can easily shift into an identity that students carry with them across contexts. This then becomes a vicious cycle.

A third consequence of a motivation-based paradigm, particularly in the context of higher education, is a perspective by instructors that "teaching content" is separate from "motivating students". In this case, the classroom as an *environment for learning* drops from view, and the focus instead turns to "managing" the classroom, such that students' choices of behavior are shaped by appropriate consequences, such as grades. A focus on classroom management apart from the "subject matter" misses the social nature of the classroom learning environment, in which learning is inseparable from the environment (or context) in which it is being learned.[4] For example, one mathematics classroom may be organized around learning to recall mathematical procedures quickly and accurately, while another mathematics classroom may emphasize mathematical argumentation and reasoning. What it means to be competent in these classrooms is very different, and students will be held accountable for very different forms of behavior.[5] Mathematics education research has shown that some groups of students prefer the latter, while other prefer the former. Thus, different students may look differently motivated in the two classrooms. In this case, locating the locating the onus for educational outcomes solely with the students, and categorizing students based on their behavior—as is often the case with a motivation-based paradigm—ignores the relation between person and context.

Research from the learning sciences demonstrates that learning is inextricably shaped by the context in which it takes place, and that learners are constantly negotiating different aspects of a learning environment.[6] A better way to describe the person-and-context relation, then, is the concept of *engagement in a learning environment*. How a person engages in a particular setting is necessarily contingent upon the forms of engagement that are made available to them. In other

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[3] Dweck, C. S. (2006). *Mindset: The new psychology of success.* Random House Incorporated.

[4] Greeno, J. G., & MMAP. (1998). The Situativity of Knowing, Learning, and Research. *American Psychologist, 53*(1), 5-26.

[5] Gresalfi, M., Martin, T., Hand, V., & Greeno, J. G. (2008). Constructing Competence: An Analysis of Student Participation in the Activity Systems of Mathematics Classrooms. *Educational Studies in Mathematics, 70*(1), 49-70.

[6] Nolen, S., Ward, C., & Horn, I. S. (2011). Motivation, engagement, and identity: opening a conversation. In D. M. McInerney, R. A. Walker, & G. A. D. Liem (Eds.), *Sociocultural Theories of Learning and Motivation: Looking Back, Looking Forward* (pp. 109-135): Information Age Publishing.

words, a learning environment is structured to afford possible ways of engaging in it. In this way, both the environment and the person contribute to the classroom activity (and outcomes) that result. Instead of trying to "motivate" a person toward a certain behavior, teachers consider the kinds of structures they have organized in their classrooms for engagement.

We find this concept particularly important for issues of equity. The motivation-based paradigm has a tendency to exacerbate existing inequities among groups of children. One simple reason is that the economic hardships and societal stereotypes that threaten underrepresented students are missing from the picture, despite irrefutable evidence that they are significant to students' learning experiences. These socio-economic factors play a tremendous role in students' lives. Thus, what may appear to be a "lack of motivation" on the part of a student in fact may be the result of a learning environment that triggers stereotypes, or that does not account for differences in resources (e.g., tutors, expensive computer programs) among students. By focusing on aspects of the learning environment that trigger the stereotypes, or acknowledging differences in students' access to resources, the student is no longer viewed in a deficient or deficit way.

CU-Boulder has a strong and affirming commitment to inclusive education. Tools are needed, however, to advance our understanding of the relation of the learner to the learning environment. We believe that moving away from the notion of motivating students to one of engaging students in learning environments could have profound effects on our school culture and our ability to create and sustain learning and participation in STEM fields.