Design Theories of Interest, Motivation, and Engagement for the Learning Sciences

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Abstract: The study of motivation and interest appears to be at a crucial juncture. While motivation and interest research continue to be major foci of educational psychologists, these topics have been according relatively little attention in the learning sciences community. Meanwhile, accountability-oriented reforms ignore research showing that such reforms lead to disengagement of "at risk" students. Additionally, it is unclear how conventional "grand theories" of interest and motivation fit within contemporary models of educational research that focus more on developing intermediate-level theory in the context of efforts to refine practices. Our symposium features five researchers in the learning sciences community who are studying interest, engagement, and motivation. Each presenter will summarize his or her work and consider the implications of that work for diversity, learning environments, research methods, and educational policy.

In the last decade, research on motivation and interest has gradually moved beyond a narrow focus on the individual toward an increased focus on contexts of learning. Unfortunately, these developments have done little to help connect "mainstream" motivation research with other important developments in educational research. The 1990s saw the emergence of important new socially-oriented perspectives on teaching, learning, and assessment. Motivation theorists generally view these developments favorably, and proponents reference the "motivational" appeal of these new approaches. But these developments have largely occurred in isolation from contemporary motivation research. Likewise, the 1990s also saw the emergence of new "design-based" approaches to educational research that focus more directly on improving practice. Rather than refining "grand" theories in well-controlled experimental settings, these approaches iteratively refine more immediately useful "local" theories in the context of efforts to refine classroom practice. A review of the recent collections of design-based research reveals few references to motivation and almost no references to motivation research. One goal of our symposium is illustrating how researchers in the learning sciences community are crafting new ways of thinking about the enduring issues of motivation and interest, and connecting this work with other promising developments.

Perhaps the most dramatic evidence of the marginalization of motivational scholarship are the sweeping accountability-oriented reforms in the US and elsewhere. Arguably, such policies represented simple-minded application of behaviorism to complex challenges. While neglecting to reference *any* psychological theories of motivation or learning, policies such as *No Child Left Behind* appeal directly to market-oriented notions of competition. Inarguably, this legislation ignores the wealth of research showing that such policies will actually cause at-risk students to be "left behind" by suppressing engagement and persistence. Such policies also ignore related evidence that the ostensibly formative goal of most educational assessment (i.e., improving teaching and learning) is undermined by excessively summative testing practices. Notably, these policies rely heavily on multiple-choice achievement tests and conventional measurement theory, both of which embody conventional behavioral/empiricist assumptions about knowing and learning. Meanwhile, the seemingly intractable debate over competition and extrinsic rewards places many of the less formal motivational practices of teachers and parents in stark opposition to the core principles that motivational scholars have advanced.

Symposium Overview

Our symposium features five researchers from the learning sciences community whose research explicitly concerns motivation, interest, and engagement. While this body of research is certainly informed by "mainstream" research, it differs in key respects. Whereas mainstream researchers started with constructs such as motivation and interest, these efforts generally started from efforts to design and/or understand learning environments. Each presenter will review their research, describing how it is similar and how it is different, from both mainstream research and from the other presenters. Each presenter will then describe the implications for their work and the insights that followed, for the following issues:

Diversity: What are the implications of this work for addressing the needs of diverse learners, particularly those who are economically disadvantaged and/or from racial and ethnic minorities? *Learning Environments:* What are the implications of this work for designing learning environments (classroom and otherwise)? What are specific examples of how learning environments would be different? *Research Methods:* What are the implications of this work for newer design-based approaches to educational research. What is the role of interest and motivation when one is developing "local" theory while iteratively designing and refining learning environments? What role do interpretive and ethnographic approaches play in this work? How do we operationalize and study engagement in classroom-based learning activities and in a topic or discipline over longer periods of time? *Current Policy Issues:* What are the implications of this work for the new focus on accountability, achievement testing, and market-oriented models of educational reform? How does this work address the motivational issues that these policies create for teaching and learning?

Discussants Ann Renninger and Allan Collins will highlight relevant contrasts and connections among the presenters, and between these presenters and other researchers.

Presentations

An Initial Contribution to the Development of a Design Theory of Mathematical Interests: The Case of Statistical Data Analysis

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Our focus is cultivating students' interests so that they come to view mathematics as an activity worthy of their engagement. We first clarify the notion of interests, in the process developing a perspective in which they are seen to be generative, to evolve, and to be deeply cultural. In considering design issues, we draw heavily on the work of Dewey, who argued that attention to students' interests should not be restricted to the starting points for instruction. Instead, it should also encompass the cultivation of students' interests in engaging in the activities of particular disciplines as an explicit goal of instructional design and teaching. We operationalize this notion of mathematical interests by defining them as patterns of engagement in collective and individual activity. We illustrate this perspective by presenting an analysis of a classroom design experiment that documents both the process by which the students' interests evolved and the means by which these developments were supported. The experiment was conducted in a seventh-grade classroom in the United States and focused on statistical data analysis. In the analysis, we document a two-step approach that involved first cultivating students' pragmatic interests in an issue under investigation (e.g. AIDS, salary differences), and then secondly cultivating students' statistical interests in which the statistical issues that arose while comparing different analyses became objects of interest in their own right. In the final part of the paper, we frame the analysis as a case in which to tease out the implications for a nascent design theory of mathematical interests and in doing so, consider the implications for instructional design in mathematics education more generally, and for equity in students' access to significant mathematical ideas.

Learning in Informal and School-based settings: A Multi-context View of the Development of Interest

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A better understanding of the development of interest is crucial if we hope to increase the diversity of those who pursue technological design fields. Data will be presented that suggest the importance of a multiple context or "learning ecologies" framework for understanding trajectories of interest and participation in learning about information technology. In particular, relationships between the cultivation of interest through activities that take place in informal learning environments (home, peer group, community centers, distributed resources) and the pursuit of learning in formal school-based environments will be explored. In addition, examples will be provided of how school environments can lead to the pursuit of self-sustained informal learning through distributed resources such as books, and internet-mediated resources. It will be argued that a better understanding of the relationship between experience and interest is needed, especially because categorical variables like gender or SES are often confounded with experience. In order to provide a broad portrait of relationships between interest, experience, and pursuit of learning, survey responses from a large sample of adolescents in two communities that differ with respect to socio-economic status and patterns of parental employment will be summarized. Interview and observational data will also be presented to highlight particular examples of cross-context learning trajectories resulting from the initiation of interest both formal and informal contexts. Implications for the design of informal and formal learning environments will be discussed.

Designing Learning Environments to Support Engaged Participation in Domain Knowledge Practices

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Sociocultural views of cognition and instruction have clearly begun to influence the study of motivation and interest. Most educational researchers who study interest and motivation now pay significant attention to the influence of sociocultural contexts on the motivational beliefs and values of individuals. A smaller number of researchers have started from an explicitly sociocultural approach. This presentation explores a stridently sociocultural approach to interest and motivation. This approach starts from the fundamental sociocultural assumption that participation in knowledgeable activity transforms that knowledge and any associated goals and values. Furthermore, it assumes that knowledge is socially defined, so that *all* such participation (with or without actual collaboration) transforms that knowledge and associated values (and therefore contributes to it). Taken in full, this analysis argues that the values and goals that support engagement in learning are defined by and resident in the practices that define knowledgeable communities, rather than the hearts and minds of individuals. This leads to the notions of “engaged participation” and “maladaptive non-participation” as alternatives to intrinsic and extrinsic motivation. This also raises the complex issue of reconciliation between the individual and the social context. This issue is considered by contrasting the prevailing “aggregative” approach that follows logically from behavioral and cognitive views with a “dialectical” approach that follows from sociocultural view. Data from a three year study of African American students’ engagement in introductory genetics is used to further explore these tensions and potential resolutions.

What Does it Mean to Be Interested in a Practice?

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Progress in our theoretical and pragmatic treatment of student engagement has been hampered, in part, by our limited understanding of constructs such as motivation and interests. For instance, although the literature on personal (Renninger, 1992) and situational (Hidi, 1997) interests is quite extensive, little is known about how interests develop and how practice structure and organization foster practitioners’ continued engagement. In order to begin addressing these issues I study individuals’ extended engagement in a hobby practice. Hobbies are paradigmatic of self-motivated, self-directed, open-ended practices. In this regard, although a hobby practice may provide a number of structuring resources that help sustain practitioners’ engagement, one’s ultimate path within

the practice rests largely within her control. This provides a relatively good window into how one's interests and goals shape her practice. My way into such a window is a theoretical construct I call *lines of practice*. A line of practice is a self-established, recurrent pattern of engagement of a practitioner with the subject matter (broadly construed) of her hobby. In other words, lines of practice are what a practitioner chooses to do in immediate connection to the subject matter of the practice. In practical terms, lines of practice define themes around which a hobbyist organizes her practice. These themes reflect a particular configuration of a hobbyist's interests and goals in the practice. I instantiate these ideas in a study of model rocketry practice. Based on ethnographic records of model rocketry practitioners' activities over a period of three years, I show (1) how a number of interests and concerns come to play in the make up of one's practice lines, and (2) how seemingly identical interests manifest themselves differently across lines. I then focus on *stable* lines of practice—i.e., those that stand the test of time—as a way of inquiring about the dynamics of long-term, self-directed and self-motivated engagement. I present some of the dynamics of stable lines and show that, far from being static, stable lines go through constant (albeit slow) micro-changes. Patterns in micro-changes across a practitioner's lines of practice inform us about the ways interests seemingly operate in sustaining one's engagement with the hobby. Finally, by identifying differences and similarities in patterns of sustained practice across subjects of very different backgrounds, I draw some implications of this work to the study of engagement in diverse student populations.

Making Motivation-centered Design Practical: A Tool for Analyzing and Guiding Design

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Edelson & Joseph (2002) reframed a subset of motivation psychology literature from a learning environment design perspective, and created the Interest-Driven Learning Framework. The framework focuses learner interest, based in a perception of usefulness, as a high-value motivator of learning, and therefore an important consideration in the development of the specific content and activities involved in learning environments. The framework further highlights motivators embedded in the learning environment context – the social groupings, classroom geography, reward mechanisms, available choices and challenges – as powerful tools to support learning under circumstances where interest may be insufficient or inaccessible. In this talk, Joseph & Edelson propose an analytical tool that identifies and evaluates motivational affordances in learning environment designs, based on the IDLF. This pilot tool is intended for use in the course of the design process, and in evaluating relatively complete designs. We describe the development of the tool through its application to two enacted learning environment designs: The MultiMedia Studio (Joseph & Nacu, 2003), a web design curriculum for 5th-8th graders, and the Information Infrastructure System Project – a suite of learning and performance tools intended to support adult school professionals. We highlight the differences between these environments in terms of the intentionality of motivational consideration in their designs, and reflect on directions for current improvement of the analytical tool and future mechanisms for evaluating learner motivation in enacted environments.

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