



Sparking and Sustaining STEM Interest Through Informal Learning Experiences: Reflections on Where We've Been and Where We're Headed as a Field STEM for All Multiplex Synthesis: June 2022

Introduction

Interest is a central, perhaps indispensable element in learning, and indeed plays an important role in most human activities. The outlines of a science of interest were laid out in William James's *Principles of psychology* (1890), in his exploration of phenomena like attention, intent, association, curiosity, and consciousness. When someone is interested in something, their attention is drawn to it, or directed to it — whether by a spontaneous noticing, or at the suggestion of someone else (a friend, a teacher, a parent). They engage in gathering information related to the matter of interest and take pleasure from the engagement. If the interest persists, they spend time thinking about it (often re-organizing the information they have gathered), generate questions about it, create meaning (e.g., see implications and connections with other knowledge), and make connections with phenomena or ideas that were not originally part of their interest, but now extend and amplify their learning, understanding, and curiosity.

Moreover, the person's social milieu can encourage or inhibit their persisting in and developing their interest. Here is where a lot of a teacher's or curriculum developer's strategy is focused: how to trigger, engage, or enlist student interest, and how to connect curricular material to the student's pre-existing interests. In part with the educational implications in mind, researchers exploring the process of interest formation and persistence have proposed models theorizing a development from situational, "spontaneous" to sustained and "individual" interest, which as it were becomes a regular part of a person's agenda and their identity (Hidi and Renninger 2006, Renninger and Hidi 2011).

Informal education, being mostly unconstrained by curricular requirements, has more freedom to create interest-stimulating and interest-sustaining conditions. This includes making connections to topics important to the surrounding communities; after all, in a sense almost everything outside schooling is a setting for "informal" learning.

In the [June 2022 Multiplex Theme of the Month](#), three informal educators talked about how they have come to understand "interest," and how their understanding shapes the way they approach their work.

The Expert Panel

[Dr. Scott Pattison](#) served as the facilitator. Scott is a social scientist at TERC, a nonprofit in Cambridge, Massachusetts. He was joined by [Dr. Natalie R. Davis](#), an assistant professor in the program in creative and innovative education at Georgia State University and by [Dr. Flávio Azevedo](#), an associate professor in the STEM education program in the College of Education at the University of Texas in Austin.

In the introductory blog, Scott posed four questions to contextualize the panel's conversation. Although the panel did not address them in formal sequence, they informed the exchange.

- Does research continue to support a linear, staged conceptualization of interest development (as proposed by Renninger and Hidi), or is there evidence that the process of interest is more complex and organic?

- Does a psychological conceptualization of interest adequately account for the complex social and cultural dynamics that shape STEM learning?
- Is it productive to focus on the ways that informal STEM learning experiences “spark” interest, or should we focus instead on how existing interests are activated and evolve over time?
- And how does the education field’s sharpened focus on equity change the way we think about and support STEM interests?

In the course of their relaxed and fluid conversation, many topics were touched on, but three important themes emerged: 1. Taking a sociocultural view of interest; 2. Analyzing interest as participation in a practice or practices; 3. Interest and education for social equity.

1. Taking a sociocultural view of interest. One feature of recent studies on interest is their focus on the individual, or on the educator-learner dyad. Thus, for example, there are close examinations of the situations and factors that stimulate a person's interest, or of strategies teachers may use to enlist a student's interest such as by making a topic "relevant" or otherwise connected to prior knowledge. Our panelists all regard "interest" fully as a social/interactive phenomenon. Scott said,

We're able to bring cultural theory and critical theory and sociocultural perspectives into this to really enrich our ideas about what interest is...another term, I think, that's floating out there connected to interest is the idea of relevance.

One's social context, whether a group of learners, or a family, or a community group, will play an important role in directing one's attention to potential interests, or interests that have meaning or other value in the context of the social group. One's interests are also related to one's identity and (especially in the case of young people) their possible identities as learners and as users or makers of STEM knowledge and practices. Natalie described how this looks in her work:

The focus of my work is around sociopolitical and everyday knowledge and how communities that may be grappling with social or socio-scientific issues that are also entangled with issues of racial justice. How do we make sense of those and what it means to be engaged in learning around those topics? And so in my work...I talk about thriving, things like self-determination, think about issues of social and political relevance, but not necessarily always using that language of interest.

This orientation overcomes a well-known barrier to broadening participation in STEM (and other fields), which is the fear (or realization) that some educational or career paths will unavoidably remove young people from their community. Natalie continued: if the learner's social context is seen as an essential and legitimate part of their education, then

now I can think about science or STEM education as something that actually brings me closer to the people and places and things that are near and dear to me, as opposed to something that creates more of a wedge.

This point of view also takes community interests, concerns, and needs as legitimate sources of topics of interest, and as a supportive context for the persistence of interest. Scott also reminded us of the importance of tapping into youth assets and funds of knowledge, which are rooted in their community life.

2. Analyzing interest as participation in a practice or practices. Flávio has explored another sociocultural take on "interest," by focusing on it as a participation in a practice (and therefore a community of practice, *sensu* Lave and Wenger 1991). He said:

I define interest as this pattern of more or less intense or engaged participation in a practice. It turns out that when people participate in a practice, they do so for a very large number of reasons, motives, movers, which is a term that Natalie has used, whatever you might want to call it... In my view, interest-based participation has this multi-dimensional motivational structure, such that when one is in interest mode, the person is in fact engaging and expressing many distinct aspects of their complex selves.

This way of thinking challenges educators to reconsider how lessons or activities, or even learning spaces, can be constructed to facilitate, and to encourage, learners to engage with many aspects of their identities — science or math identities, naturally, but also place identity, ecological identity, cultural identity, etc. Indeed, it allows all these constructs to be seen for what they are — mutually interacting facets of whole individuals, which may also be contact points to invite participation in (interest in) new practices. As Natalie said, educators need to:

try to actually understand how young people, how learners, are already engaging in many different practices that they find interesting and relevant to them, and how can we move from an understanding of the relationships that they have, the motives that they have for wanting to engage in those various different types of activities, and actually learn from those things about how to design for spaces that they might find to be spaces that feel relevant or that feel nourishing to them.

This rich view of the learner recognizes that the learning can contribute to the learning environment with concepts, experiences, and values from their community lives. The learning environment contributes the concepts and practices of the STEM disciplines, which can enrich or expand the learners' capacity to participate in the practice of science, engineering, etc. Scott added that:

we don't see it as just a linear progression of interest, we see it as an intersection and mixing of what they brought into it and what the experience had to offer that leads to something that really is completely unique, and sometimes to your point, Flávio, transformative and sometimes not.

3. Interest and education for social equity. The view of interest that our panelists were discussing, because it seeks to recognize learners as learning while participating in their sociocultural context, connects in a natural way with issues of justice and equity that may be alive in the community and in the students' lives. This vision for STEM education asks, as Natalie put it,

what would it mean to take that [STEM] content and make it accessible and something that kids...would want to learn or learn more about and explore, but also helping them see it as something that could help them, that could contribute to improve circumstances or help them accomplish their dreams and goals?

One thing that it would mean is a critical analysis of access, of structures and barriers to sustained, engaged participation. As Flávio remarked,

at the moment that we begin to talk about identities, we're talking about the politics of who can do what and when and so on. And it goes with connections, with as Natalie said, across communities and as you see yourself in different relationships with people. I think that as we think more about these ideas of the relationship between them, what it means to be interested in something and long-term participation in STEM practices.... It's in a way finding this resonance that may carry for a long time given contexts that...are designed to honor the capabilities of children.

The incorporation of such considerations should also make the educator ask, in Natalie's words,

What does it mean to design for learning opportunities that actually position young people in ways that allow them to do the kinds of things that they see need to be done in the world around them?

This question is a pressing one for educators in the Anthropocene era, with its multiple interacting social and environmental challenges, all of which press most heavily on those already disadvantaged or marginalized. Natalie suggested that educators who are committed to "trying to move toward dismantling inequitable, unjust, dehumanizing structures and systems in our society" need to develop "a certain type of dexterity and intentionality around how we design and how we think about interests and relevance and why we are learning about particular concepts, what they can be used for, the ways that they can be used for good or for positive, for transformative changes in our society and the ways that they also have historically been leveraged in ways that work to the disservice of humanity, of living things, of people and places and spaces."

The panel, the participants, and [the resources](#) provided for the Theme of the Month did not provide a short list of "best practices," but rather presented an exciting and challenging paradigm shift in the way we can think of interest as socially situated, socially created participation in communities of practice, among whose empowering cultural tools are the STEM concepts and practices advocated (for example) in the Next Generation Science Standards. In this new paradigm, a key educator practice is listening to and learning from the students and to others who are important in their lives, such as parents and community members. As Scott said,

I would like to see greater recognition of the rich learning that goes on at home and intentional strategies for connecting this learning with the classroom and vis-a-versa. This, I believe, would require a power shift, with teachers and parents seeing each other as partners in children's education and the creation of communication strategies and dialogue spaces for families and teachers to share knowledge with each other

Recommendations for Researchers

The sociocultural reinterpretation of "interest" and related ideas has generated much research interest, but an area in which more research is needed is around educators' uptake of this understanding. How does it motivate changes in pedagogy and content explored, in after-school, informal, and community-based STEM settings? What changes does it make in participation patterns, patterns of discourse, and the distribution of authority in the learning setting among educators, learners, community members, technology, or phenomena? How, if at all, are these changes related to changes in motivation and self-efficacy in students, especially those from minoritized or marginalized communities?

Recommendations for Educators and Administrators

The panel recommended "promoting a two-way dialogue between schools and home," as opposed to a one-way transmission of information. For administrators and educators, this provides an opportunity and a challenge to learn how this work has been initiated in other learning environments, and how the conversations have been framed and sustained productively. This suggests also that administrators will be challenged to find resources — of time, especially, but possibly also space, expertise, or materials — to enable educators (e.g. teachers, informal educators) to dialogue with their students' community,

and work to change their practice to reflect their learning. As always with pedagogical innovation, time for educator collaboration will be indispensable.

References

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