What is STEM Interest?

An Interview with Flavio Azevedo

On April 9, 2018, Kevin Crowley, Professor of Learning Sciences and Policy at the University of Pittsburgh, interviewed Flavio Azevedo, to understand his thinking and work on the topic of STEM interest. Dr. Azevedo is an Assistant Professor in the Department of Curriculum and Instruction at the University of Texas at Austin. His research focuses on three intersecting strands: the nature of STEM interests and interest-driven participation, learning out of schools, and foundations of cognition and learning in STEM disciplines. A video of Dr. Azevedo's interview, as well as interviews of other researchers, is available at InformalScience.org/interest.

What led you to study the concept of interest?

Well, basically, two reasons. The first one is personal. I was a pretty good student in K–12, but I hated school. I just didn't see myself in anything that was happening in there. At the same time, I had a lot of interests in stuff outside of school, in engineering, physics, and things like that. And I didn't see any of that happening in classrooms. When I started my Ph.D. and I began working on my research, I was immediately attracted to the idea of interests because it related back to my past as a student. The second reason is that interest was then, and still is, a research gap. It seemed obvious to me that researchers had done a pretty decent job studying cognition and how people reason about math, science, and whatnot. But there was comparatively little research on interests. The cognitive revolution had come and gone, and had done a good job, but we knew very little about interests compared with the rest.

What are some projects that you've done recently involving interests?

Overall, my work has focused on studying interests outside of classrooms, in spaces like afterschool programs and hobby practices like amateur astronomy and model rocketry. I'm currently studying people canoeing down rivers in Texas and doing citizen science and things like that. In those contexts, I'm still studying interests and how interests are manifested in these places. So, for instance, with regard to hobbies, the idea is that hobbies are just prototypical practices that are interest-driven and interest-based. Nobody's paying you to be there. The motivation really comes from how you see yourself in the practice, how you feel about your participation in it, and what you get from it. Looking at long-term interests, what we call individual interests, has been one of the key things that I've done, and I follow people across many years to see the process behind these patterns of long-term participation. I think that has been one of the crucial parts of my work. The reason to

compare and contrast interests across these spaces, like afterschool programs, hobbies, the home, and so on, is to see how interests are manifested differently across these settings. I think that interests appear everywhere, in schools and everywhere else, but they do so for different reasons and in particular ways because of how they are placed in those contexts.

What is your specific definition of interests, and how does that differ from the definition used by other people in the field?

Like everybody else in this field, I distinguish between short- and long-term interests, and I think that it is important to understand both in order to understand learning and how to promote interests in classrooms and outside of classrooms. I think that there's an important difference between the way I conceptualize interest and how it appears in the literature. In the literature, it's generally like this: "Interest is a relationship between a person and a topic or domain." What we're studying is this relationship. But the relationship is pegged, it's targeted at a topic or a domain. So, that's why we say, for example, I have an interest in education, or I have an interest in piano or in chess playing or whatever. Or we say that a student has an interest in mathematics or doesn't have an interest in mathematics or in science. My conceptualization of interest is broader than that, it's a set of inter-related activities, and I think that's a crucial difference. For example, when you start pursuing a hobby like model rocketry, you have a tendency to say, "I'm interested in model rocketry." But, it turns out that, empirically, immediately a lot of other parts of your life become entangled with your practice of model rocketry. So this is what I call the multi-dimensional structure of interests. In other words, the motivational structure of interests is multi-dimensional. Interest is really a pattern of long-term pursuit and there are many reasons for why you're pursuing it. The moment you begin to pursue model rocketry, it has to do not only with your relationship with rockets and the stuff of model rocketry, but also with the practices that you already have elsewhere in your life, and which

express an identity of creativity or competence. With model rocketry, you can practice design, which you're already interested in, and which you already do outside of that hobby. So, basically, rather than just thinking of the relationship between the person and the object as being the domain, I say that the domain is a variety of activities that go together in some interesting ways for you.

How does your approach to interests relate to longer-term engagement in science over the course of years, either in the STEM pipeline or outside of school in a hobbyist context?

When I study people, I study them over three or four years. What I see is that people immediately develop many preferences within their practice. For example, you begin to relate to model rocketry in many different ways that are continuous with many different things you do in your life, other activities in which you engage. Some of these ways could be related to classrooms or to the stuff that you do in classrooms. So, some of my subjects who were interested in model rocketry actually had experiences where they could demonstrate some of their knowledge of model rocketry and their understanding of physics in the classroom, based on what they had done in the hobby. They didn't have opportunities to do that in that classroom before. The idea is that these preferences are connected and linked to one another, over the many spaces and settings that the person occupies or travels through. If the connections are good, then they sustain engagement over the long haul. The challenge for us is to find a way to cultivate those kinds of continuities over time, so as to support a people's multiple, multi-faceted preferences so that they can exercise their interests across many different spaces: in museums, in afterschool programs, in the classroom. Then they can develop their preferences and try them out over the long haul and in different spaces where they encounter STEM content.

Should we try to get STEM interest to be more closely associated with practices like model rocketry, to get kids interested in science?

I think that that is too broad a lens. I don't think that really captures the nuance or the texture of people's interests. If you ask whether a certain person is interested in science, the answer might be, "well, in some ways, in some specific contexts, given the right situation," and so on. I don't think that describing it in terms of getting people interested in science is a useful model. For example, for a person with some interest in model rocketry, that interest in model rocketry is also tied to their ability to engage other aspects of their life, such as the practice of using or crafting stuff with balsa wood, which the person enjoys, and so on. So, there are multiple things that go with that interest. I would say, sure, some people get interested in these particular domains and topics, and we should provide them the opportunities to get involved. Yet if we understand the interests to be just about the domain and the topic and miss everything else that goes with it, then we won't be able to design opportunities for people to really develop their science interests.

What's some practical advice that you would give to practitioners who want to base their work, their programs, or the environments that they build on your research?

I think one of the key things is for us to learn to recognize an interest when it's there and when it's being sparked or triggered. Understanding the complexities of interests, as I have mentioned, is one of the crucial things. If you learn to see interests in their full complexity, then you learn to support them. Beware of simplifications. Let's say Joey has an interest in mathematics. Well, how accurate is that statement? Is Joey always interested in mathematics? If you look closely, you'll see that, no, that's not always true. It is related to some activities that allow Joey to express other aspects that are within Joey. So, don't get disappointed if Joey is not interested in math two days later, because that is likely to happen.

Other things follow from understanding interests and their complex, multi-dimensional structure. For instance, it takes some time for an interest to take hold. Educators or museum exhibit designers want to trigger people's interests and have them persist and keep going, but then they're disappointed that the interest disappears 10 minutes later; they want it to be magically sustained. But interests take time to take hold, and people sometimes have to experiment with these things more than once to really say, "oh, yeah, this is how it makes sense to me, and I would like to appropriate this thing and make it an interest of mine." We always say that we want to design activities for people's interest-based pursuits, but then we don't allow enough leeway for them to try out certain things and adjust the activity to their interests. If you understand interests in this pretty complex way that I'm trying to paint, you immediately see that the activities that take hold when people get "really into it" are really diverse. They are very idiosyncratic. So, you have to be prepared to then support this huge variety of activities that will emerge when people really get interested in the things that you design. And if you really want to design for that, make sure that they can then really change things and make it their own. If you expect them to stay within the curriculum or just focus on the things that you imagine they have to learn in that particular activity, well, sometimes interests are not exactly about that. They have a logic of their own, and you have to be prepared to let the activity move slightly away from what you had intended. That's where it becomes a real interest for the person and allows the person to make it his or her own. That's why you need time to do that kind of stuff.

How do you think about identity, motivation, and other concepts that are closely related to interest? Are they the same thing in your mind?

I don't think they are the same thing at all. They go together, but they are not the same. In my view, people participate over the long term in interest-based activities because they can engage all of these "concepts" at the same time. So, I might pursue a

hobby because I'm a certain kind of a person, because I identify with this practice in particular ways, and because I have various preferences that intersect with it. So, identity, interest, and motivation go together in synergistic ways and combine to make a person pursue a practice long term. But an interest is not the same as a person's identity or motivation. These are separate. In fact, it is crucial that they be so, because then you can see them interacting and how, in their interaction, they support the patterns of engagement that you see in a person's pursuits.

How can evaluators or practitioners measure or assess interest, in a practical way, to improve their work?

That is an area that I would like to learn more about. In my work, I don't really need to assess interest. I study processes of interest triggering, interest development, and long-term pursuit. In these situations, I take, for instance, a hobbyist, an amateur astronomer, who has been practicing amateur astronomy for several years, and then I follow this person in an ethnographic form over several years. The only thing I "measure" is how the person's participation in the hobby changes over time. The person obviously has a long-term, individual interest in the practice of amateur astronomy, so I don't need to measure in the way we normally conceive of it. I videotape the interactions, and I follow people all over the place, wherever they go to practice these things. I watch these videos over and over, and I try to make links between how certain specific aspects of each of these contexts shape what and how people pursue their interests in each of these spaces. That's the extent to which I measure things. But, I admit, measuring interest is an area that I'm interested in learning more about.

Some researchers have developed five-question scales to measure interest.

Right. But how good they are? I don't know enough to critique or to support them. I know, for instance, Bill Penuel has been developing one. Bill has been thinking about interests in this complex way that I've been thinking about as well, so how is he doing that and how efficient is that? I've written about lines of practice. The empirical work takes forever, and I've been wanting to find ways that are less time consuming and less expensive. I am honestly interested in measurements and other forms of data collection that are not the video-heavy, intensive, time-consuming things I've done. I think they are useful as well, so I think we need to study them.

What are the big questions around interests in informal science communication, science communication, or formal science education over the next five to 10 years?

I think we still have a lot to learn about interests. We really have to consult the field and see what consensus points we can follow. My particular project is to figure out more about interest development. I think we have a pretty decent understanding of how interests are sparked, how they are born, how they emerge, and some knowledge about long-term patterns of interest pursuit. But we really don't know much about what happens in between, at least in terms of processes in the way I've been trying to follow. I think that that's a very crucial area, and I think it could help the field and could help education a lot. I think that would be an interesting challenge, and I think that if we did it well, it would be a very, very important contribution.