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## AnSpec Research Methodologies

We should probably just let kids be in charge of our methodological dreaming. Talk to any toddler long enough and what you'll get is a bubbling mixture of off-hand observations ("Daddy was grumpy, I ate some strawberries, that doggy's name is Olive") alongside playful innovations ("this [invisible creature] is my anteater named Squeak, would you like some of the mango ice cream I just made out of bark and fortitude, I bought this spaceship from Costco"). This stream is nonrandom data, all carrying personal information for a rapidly developing brain and an individual's agency enacted through possible play states. The bid to take an imaginary ice cream or to pet a (usually friendly) invisible anteater: these are the attempts at finding the boundaries of what's possible, what's permissible, and what the rest of the (usually adult) world deems impossible. It is in these attempts when the bids for new forms of play are discarded—a phenomenon that is itself a point of data collection for children—that students discover the rote methods of mundane life within which we are expected to comport our bodies and minds.

Perhaps contrary to the ornery nature of some parts of the opening chapters of this book, we do not *blame* data for the myriad problems plaguing education and educational research. Rather, we point

to the lack of imagination around what data are possible or what tools might be expanded as collectors of data that are overlooked or deemed otherwise impossible.

Education is a space of intentional praxis. We say this knowing that the word *praxis* is bandied about too often. For us, the marriage of theory and practice means taking the key speculative component of this book—an AnSpec framework—and working toward practical applications in formal and informal learning environments. There are very few theoreticians of education who do not also teach and/or learn; most of those people presumably at least consider their own theories when trying to teach and learn. It is unlikely that you will find many, say, constructionists teaching gigantic lecture classes with high-stakes testing and weekly quizzes. (Complicating the situation, however, is the fact that many people have jobs that ask them to do things with which they do not agree.)

This street goes both ways for many of those theoreticians: many (if not most) educational researchers would like to understand how they might teach more effectively, learn more efficiently, or improve their own schools. Many fields are united by a subject matter, but education is slightly different, as the only agreed-upon category definitions are unacceptably broad—“human betterment but not in a medical sense” or something that might also feasibly contain all the arts or “school stuff”—which could also contain land management, real estate, and payroll.

If *education* encompasses everything from the nuances of flower pressing to mastering the art of real estate management, then *learning* might be slightly more specific: becoming more able to do or understand something. I am more able to pound a nail with a hammer than I am with my hand—I could not get the nail in without the hammer. Is that learning?

Regardless, figuring out how to use a hammer is closer to what you or I probably mean by *learning* than *education* is to “having a good day.”

Fittingly, the diversity of the definitions for terms such as *education* and *learning* also supports a similarly broad variety of research methodologies. In this chapter, we outline how one might use AnSpec and the lens(es) of play, data, and justice in research across critical, theoretical, empirical, and design perspectives. For the purposes of the chapter, we define *learning* as “coming to understand how to do or make something new across multiple contexts” (and we will, mercifully, avoid any unpacking of the words *do* and *make* here). *Education* is broadly defined here as “the schooling that foregrounds teaching and learning.” These are not particularly useful as *universal* definitions, but they give us something from which to work.

As a “way of seeing,” a lens can help pull particular aspects of the world around us into focus (Berger, 2008). Salient to the aims of this chapter, AnSpec as a lens provides us with a connected set of features to foreground, such as anonymity, cooperation, and agency. So, what happens if one uses AnSpec as a lens on something as simple as a chair?

Here is an exercise: Use AnSpec as a lens to study the chair you are currently sitting in. How do anonymity and aggregation interact in, around, from, and through your chair? If you are not sitting in a chair, you are explicitly exempt from the assignment, but couches are chairs now. (Here’s the part where you stop reading for a second, groan audibly at the suggestion that you must break your concentration and either close your eyes and think for 20 seconds or feel a twinge of guilt in convincing yourself that you will come back to it.)

Here’s a stab at one author’s chair: the memory foam, heat signature, and limited number of people with access to the chair make it easy to fully identify the last occupant. That said, the more people who use the chair, the less identifiable those data become. If, for example, two or more adults have had access to the chair before you, it is unlikely that you, lacking proper instruments and expertise, would be able to identify who sat in it, the order or duration in which they sat in it, or the amount of time each person spent in the chair. That is, the

chair, with or without an AnSpec lens, tells me relatively little about education and/or learning. (This makes it even more unfortunate that some people measure students' behavior—and thus grades—by how long and how still they can sit in a chair.)

So, how do we *study* education and learning outside of chairs? What would it mean to see them through the AnSpec lens?

As with a lot of research methods, the fundamental questions come down to: “What are you trying to ‘solve’? What are you trying to understand? What is the problem?” If we’re trying to understand how to see education and learning through the lenses of play data and justice, we might need to figure out what an end goal would be. What is the value of the research? If the research does not hold value for anyone other than the researcher, it is not research.

### **Question 1: What Problem Are We Trying to Solve?**

If successful, this book will enable readers to generate creative solutions on how to use data ethically in education. Let’s say we are trying to design a system that supports people in understanding which data they are giving to, say, Social Media Company H (SMH, for short). Why would we do this? Is this a problem that would be solved by exposing the data? It is trivially true that relatively few people feel that exposing personal data comes at a personal cost. It may be that people see exactly what they are giving to SMH, and their reaction is to think: “that seems like a fair trade to receive a free service that I use daily.” Does the act of creating a tool that exposes them to their data imply that: 1) they should not feel that way; 2) there is something implicitly “wrong” or “evil” about the trade; or 3) we assume they have no idea about what data are sent to SMH?

A quick aside with some details blurred: Matthew was talking to a developer—I will call them “Space Ghost”—at a popular social media entity when it became public that they only offered “posts” that

“maximized engagement.” That is, the system put people in a bubble and was stoking impotent rage on purpose, and these things corresponded to attention and clicks (i.e., money). Space Ghost was legitimately surprised that this was not common knowledge, as were most of their friends at the company. They said, “What do people think we do for a living?” This was a private conversation with a friend, and they were not feigning naiveté. They literally could not understand how people could conceive of or rationalize free receipt of the service as *not* being about getting views that lead to ads. In this case, the design of the tool was done from a different angle of bias but was conscious of that bias. They wanted to maximize ad views—this was the problem to solve—and the theory makes it clear that emotion leads to more ad views, and that the more emotion (positive or negative) that was elicited, the more ad views the company would receive. Rarely in research on learning or education is the target so clear or the consequences judged irrelevant.

## Question 2: Can the Learners Make Meaningful Decisions?

The bases for learning any content often hinge on two core questions: 1. Is there manifest value in learning the content? 2. If so, how can the learner see that value in the content? Then there is another question: 3. What role do learners play in deciding whether and how they see or use that value?

It may be the case that our learners do not see obvious value in understanding the flow of their personal data; it may be the case that they are correct not to see that value. It is, perhaps, the case, as we suggested earlier, that they have made the decision that the trade of data for functionality is a good one. Can those students *not* engage in the activity? Should they be able to avoid engagement? We rarely force adults to learn some specific content, and there are very few mechanisms to do that.

Let's say it is possible to convince a group of learners of the value of the activity. (That is not always particularly hard.) Can they make decisions in the activity that are meaningful for them? Can they make choices that affect the activity going forward? Simply submitting information to a teacher—while very common in traditional schooling—tends to feel bad to most people. Can people make decisions about the consequences of their actions? Decisions in life—even minor ones—have some short-term consequences, whether it's a simple, conscious decision (“eating makes me less hungry”) or something more implicit (looking up => a tree is seen).

How can we ensure that we are respecting the agency of our learners? The basic tasks of research are important here: we must ask people, listen to them, and see what they do when given the chance.

That said, asking them is often insufficient, and there are conditions in most schools for specific answers. One way to get those answers might be to look for the relationship between their decisions and the way that they interact with the consequences of those decisions. In our activity, we might try to verify that many possible activity-based decisions are being made by students in ways such that they invest time in the consequences of those decisions.

In life, we often try to evaluate our *own* engagement by how much and how well we create habits. If we do not go to the gym every day, despite saying that we want to go to the gym every day, we do not assume that we are engaging in “gym life” *in absentia*. That said, if we do not take some time to evaluate the possible set of decisions and options, we will almost certainly commit to something in which we do not want to be deeply engaged (maybe cycling is more engaging for you than weightlifting, but you would need to have tried both, perhaps). It's a tricky balance.

In Berland et al. (2013), we propose a name for this pattern: EXTIRE. EXTIRE stands for exploration, tinkering, and refinement; it implies some commitment and some manifest agency on the part of the learner. Something like EXTIRE is simply part of “see what they do

when given the chance.” That is, when you are learning something new that is complicated, one particularly productive trajectory is first exploring the space (e.g., trying all the different weight machines at the gym for less than a minute), then tinkering (e.g., settling on a few for an extended amount of time, and then trying out changes in the various ways that you interact with them), and finally refining (e.g., settling on a single machine and engaging in some focused way to improve your form).

### **Question 3: How Do We See Our Own Bias in Designing, Developing, and Deploying a DBR Learning Environment?**

Design-based research (DBR) is a method by which people investigate and attempt to change and improve conditions for learning. DBR is defined (roughly) as designing in an environment in which to test psychological or educational theoretical constructs. In practice, this often looks like the design of a specific learning environment—which may be a game or a simulation. That environment is typically designed to be an effective learning environment, one where we can verify that people are learning something, but, because the point is to test some theory rather than to design the best system, it still may not be the most effective learning environment.

In DBR, *design* refers to the initial idea, iteration, construction, development, and deployment of some learning environment. Obviously, we are deploying a very expansive version of the word *design*. That said, collapsing all these stages into the word *design* enables us to focus less on the “design research” aspects and more on the education or learning theory aspects. Fundamentally, a design is required to be good enough to enable us to see something with whatever we have created. In some ways, this could be thought of as the design of instruments or tools in a chemistry experiment. For example, if you want to

test the caffeine content of coffee, you need some set of instruments that enables you to see that caffeine content in the coffee solution. Then, when designing your tool, you must keep in mind that your instrument can have some limitations; it doesn't necessarily have to account for every single molecule of caffeine to be useful. Similarly, we need to pay attention to the biases of developers and designers of the tool to identify what the tool tells us about that theoretical construct. For a long time, a lot of DBR did not consider the bias of either the designers or the subjects/participants in an experiment. However, in the past 20 years, exploring these forms of bias within design has, by and large, become required in papers that use DBR.

As so many people have said—not least Marx—it is difficult to see outside of one's default perspective. One word for this (multiply defined over history) is *ideology*: the idea that hegemony exists to “legitimize itself.” To dramatically oversimplify, Adorno and Horkheimer (1997) suggested that the only way outside this self-perpetuating cycle was to understand one's role in the system through intersubjectivity—that is to say, through critical discourse. In this case, that critical discourse must both engage consciousness of the systemic factors (e.g., racism, classism, etc.) along with the context and content of their form. Freire suggests that any critical process in education must always strive toward co-creation of knowledge in the context of those systemic factors and with an eye toward fomenting change. There are a few models of DBR that “bake in” that kind of conscious co-creation; one such model is called “participatory co-design” (PCD; DiSalvo et al., 2017). In our case, we can engage students in critiquing potential designs as we start and have them also generate ideas for designs. Students are typically not trained in design, but they often bring ideas to be integrated into a project through design sessions, and people are typically very quick in PCD to see what “feels false” to them. Does this speak to you (the reader), or does it feel like it targets a stereotype? In our case, we might take a preliminary design to students to play with and have them rip it



apart. The benefit is that the more we do this, the more vocal and specific the co-designers can be (and it might help keep us on schedule, as well).

That said, the design phase is hardly the only place to explore the bias inherent in the system. O’Neil (2016) describes code audits as a very useful tool for examining bias. In an audit, the auditor explores a space of possible inputs and outputs for the software, and looks at them with a critical eye, and evaluates the code itself for implicit bias. For example, if we generate avatars at a specific rate by visual characteristics, why, how, and what went into that decision? Does that decision pander or exclude? Is it editable, is it contextual, is it transparent? Would we be able to support our choices if we were describing it to a diverse audience? Though most audiences do not understand code, they can almost all understand the ways in which the visuals might (or might not) represent the kids who are playing the game. Rather than treating the code as “imperfect and unknowable” (as most projects do, even thoughtful ones), it is incumbent on us to make those implicit decisions manifest.

Bias exists everywhere; even “charitable objectivity” does not exist. We choose which experiments to run, how to build them, when to build them, with whom to build them, when and with whom to test them. The point of design is not to somehow “escape” bias or create the perfect acontextual research tool, but rather to make it clear how the story of the research is shaped both by designers and participants. The power relationship between researchers and participants is similarly both nuanced and important to unpack.

Learning is not the downloading of knowledge into one’s head. Therefore, we cannot reasonably say that a tool taught someone something. A person must engage with the tool intersubjectively. No one can force knowledge into someone’s head; we can only reward or punish the results of some knowledge. It’s hard enough to find evidence of understanding, as we will see in chapter 4 on assessment futures.

Given these questions, how can we see the relationship between aggregation and anonymity?

AnSpec is a powerful tool for understanding when, how, and why design shapes a learner. How many people are we engaging, and in what way? Remembering Freire's (2018) requirement regarding knowledge co-creation, are we assuming that people are engaging with the technology individually or in aggregate? Are we treating the learners as if they are starkly individual or stronger as a group? Are we asking for, prioritizing, and incentivizing critical discourse? Is this done through the design itself, or through an imagined teacher/facilitator?

A lot of the decisions we make in design revolve around what the designers get in return; what are we designing to motivate? It is said that *nothing in life is free*. The tradeoffs exist both diegetically and at the level of the research proposal. Nevertheless, it is a false dichotomy to suggest that affording people not just choice, but also agency—here, both meaningful choices and the resources to make those choices in accordance with their values and needs—comes without some kind of cost. Typically, the designers want, at the very least, some assurance that the game is “getting played” and that people are either paying for it or that a “customer” gets what they expected. For researchers, this is typically a process that involves a human-subjects review board (an institutional review board or IRB) that often focuses on maximizing the information and options that people must have to engage in the project. It used to be the case in schools that parents and teachers could sign a “permission slip” without informing students, but now even younger students are informed, and their permission is often required. In the case of corporations, which are typically bound by few such rules in the US (though they are subject to many more in, say, the EU), they can collect whatever information they want without asking permission from anyone, as long as there is no explicit breach for which they could be sued. Even then, it is typically cheaper for companies to settle such lawsuits with a cash payout and nondisclosure agreement than to miss the opportunity to collect

such valuable data in the first place. Still, such permission forms ask for data from users, and, even in the most well-meaning IRB proposal, the ways that the information is relayed to learners does not necessarily account for what and how they understand their personal data. Indeed, it would be too much to ask any project to teach data literacy before whatever other work they do; if a researcher is testing galvanic skin response, the intervention cannot require six weeks of instruction on the ways that biometric data might be misused.

Therefore, as in earlier chapters, we stress that it is always incumbent on us to collect *only* that information that we need to collect. This is, perhaps, complicated by this chapter's example project goal of supporting learners in understanding their own data. Looking at the problem from the perspective of AnSpec, we can see that there is space for aggregating some meaningful amount of the data generated by the class. There is also no need to explicitly collect all the data that the students see; as counterintuitive as this may be to any designer, we do not need to keep all the valuable data that we use in the activity. Contrarily, simply keeping around the "types" of those data may be more helpful to all parties; it is perhaps the case that a given website can see the student's home address, but we do not want that information on our servers at any point. A flag for "HOME ADDRESS FOUND" is just as informative while reducing the "risk surface" significantly. A focus on anonymity prompts further questions, as we saw in chapter 2: What information goes to the researcher? What information should be transparent to whom? Does it differ in a project about transparency of data? These questions tie tightly to the question of "what counts as data." How can we design a system that gets the data that would enable us to better understand how to help people understand their data while respecting their privacy and agency? What do we keep?

In graduate school, we were taught to KEEP EVERYTHING. KEEP EVERYTHING ALWAYS. This was repeated enough times in enough classes that we suspect everyone has had an experience in which valuable data were lost and experiments or even whole research projects

were abandoned. There is a lot of value in the perspective—that “researchers cannot know exactly what they are looking for, or it would not be research”—but research cannot come at the expense of learners’ agency and privacy. An important example is the case of Henrietta Lacks, who was robbed of any agency, but whose “HeLa cells underpin much of modern medicine; they have been involved in key discoveries in many fields, including cancer, immunology and infectious disease. One of their most recent applications has been in research for vaccines against COVID-19” (Nature, 2020). The ethical debate over the posthumous rights of Henrietta Lacks and those of her descendants remains open, but we center individuals’ agency as the moral imperative in how we interpret research.

Similarly, we may come to points at which it might also be incumbent on us to share our learner-generated data, disclose what we kept, and explain why we did so. This should not be too high a bar for our work. Is it ever OK to keep data that you would not feel comfortable explaining to a subject? Medical research asks this question consistently, but it may be time to import the question into the learning sciences. Some data about perceived identity may do harm to a learner’s understanding of themselves, and the collection of it may simply reflect the systemic bias of the researchers. An example of this would be disclosing the relative success on a math problem to both the learners’ fellow in-class students and the entire dataset. Data may imply to them that their class or school is “good or bad at math” even though an actual statistical analysis would show nothing of the sort . . . but a complete statistics class would be an inappropriate intervention in the middle of our learning activity.

## Every Act Is an Intervention

Frameworks do not offer anything useful unless they are in conversation with an existing idea or structure. Like the frame of a

house, a framework is meant to uphold or—in the case of a scholarly intervention—change something. AnSpec, the framework we are offering here, might help you avoid aspects of our work that are otherwise going unnoticed too frequently; this framework helps denaturalize naturalized bias. While this bias is not unique to AnSpec, the position of much of education and the learning sciences is that praxis—in this case, using theory instrumentally—is the best we can do. Similarly, although all practices are subject to critique, Matthew's advisor, Uri Wilensky, would often ask him: "What did you foreground? What did you background? What is erased?" It is our position that, whether you like it or not, you are acting in the world: every act is an intervention, and, therefore, it is imperative to look through a critical lens as you act.

This critical lens does not just look outward; it is also a mirror. As we think about the problems and phenomena with which we seek to intervene, we must approach our research with the recognition that we might not always be the best individuals for the job. What kinds of agency do young people, other members of our educational communities, and the general public demonstrate in the work that we do each day? In answering these questions, we will take a hard look at our own assumptions about the workings of the universe and our location within these systems. These DBR questions, re-posed here, remind us that sometimes the acts that requires our interventions are found within ourselves and not just in the external and noisy world that beckons at the threshold of our sensemaking.



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# The Left Hand of Data

## Designing Education Data for Justice

**By: Matthew Berland, Antero Garcia**

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