

Podcast: Good Enough Homeschooling

Episode: 11: Teaching Critical Thinking and Cognitive Biases

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Transcription by Keffy

[00:00:00] [Sound of book pages being rapidly flipped.]

Courtney: [00:00:12] Welcome, listeners, to the Good Enough Homeschool podcast where we cheerfully eviscerate popular homeschool curricula. In today's show, we're focusing on critical thinking, what is it anyway? Can you teach it? And if so, what works best.

AJ: [00:00:26] So I thought we'd start by defining what we mean by critical thinking but that turns out not to be as easy as it sounds. So Merriam Webster's doesn't even have a definition of it as a set term. The Oxford Languages Online Dictionary defines it as, quote, "The objective analysis and evaluation of an issue in order to form a judgement." The Stanford Encyclopedia of Philosophy describes it as "Careful thinking directed to a goal." And if that's not a vague definition, I don't know what is. John Dewey, our old progressive education maestro here, defined it as "Active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends."

[00:01:14] So when we as classical homeschoolers say that we want our kids to develop good critical thinking skills, I think what we often mean is that we don't want them to take every claim they encounter at face value. We want our children to learn to question, to analyze, to evaluate ideas rationally and objectively before they accept or reject them. And we want them to develop these skills as intellectual habits.

[00:01:38] And this is pretty important because right now we're living in a world where the very idea of factual knowledge is routinely called into question. And many of us are seeing friends and neighbors and family members, and even our elected officials reject science and promote really wild conspiracy theories.

[00:01:52] We have a lot of questions here. How do you acquire these skills and apply them broadly? Can you just master one subject like, say, Latin grammar or computer programming and will that help you think critically in other fields like sociology or biology? What kind of background knowledge does a person need before they can even begin to think critically about a given domain? How long does it take to acquire

that level of expertise? How does critical thinking relate to other buzzwords like problem solving, or creativity or innovation? All those TED Talk words? And can you teach critical thinking by teaching formal logic? Because this is something, of course, that classical education claims.

[00:02:33] As I said, lots of big questions, and I can't guarantee we're going to answer them definitively in 30 minutes, but we're going to try to give our listeners some material to dig into, as you all start to think about how to help your kids be better thinkers.

Courtney:

[00:02:47] I don't know about you, AJ, but I always like to go to the science first. And in this case, I like to go to cognitive science, and more specifically, Dr. Willingham's most recent article for American Educator was actually on teaching critical thinking. He does this, interestingly enough, as having three components. He says that critical thinking is when your thinking is novel, or new. That is, you're not simply drawing a memory like it's just like this and I'm going to repeat, division, exactly these steps. You've got to come up with something new. And your thinking is self-directed. That is, you're not following a recipe, someone else's ideas. And your thinking is effective. That means that you do things that make it more likely than not that what you're going to come up with works.

[00:03:38] And he says that critical thinking can be taught, if you define it this way. For example, if you teach students to use certain criteria for evaluating a thing, and then you have them evaluate the thing with that criteria, voila, they do better than students who are taught general principles rather than evaluation criteria. Which is great, but this is not what most people think about when they envision critical thinking, is it? Instead, we want the sort of general skills that transfer from one situation to another.

[00:04:10] This was, by the way, one of the original arguments for classical education back in the 1800s, that Latin and geometry would teach these general critical thinking skills. And in fact, it was, I hate to tell you all this, it was tested and proven false 100 years ago.

AJ:

[00:04:26] Ding ding ding.

Courtney:

[00:04:29] Later educators tried it again, (we keep trying this,) with computer programming in the '50s and '60s and '70s. And Willingham says they found that it did permit a small amount of increase in mathematics and metacognition, and spatial skills, and reasoning. And I would argue that correlation doesn't indicate causation. I actually, at one

point, did some programming. And anyone who has programmed has had to use these pieces of knowledge and skills and abilities in programming. It's not necessarily that programming itself would teach the skills better than, say, a dedicated math curriculum.

[00:05:05] And, as someone has raised kids for a while. I don't know about you all, but do you remember all that hype about the Mozart Effect?

AJ: [00:05:11] Uh huh. Yep. All those little videos and CDs and DVDs and things that we were supposed to listen to and watch and...

Courtney: [00:05:19] Musical instrument training, teachers [crosstalk] make sure they have—

AJ: [00:05:22] Suzuki.

Courtney: [00:05:24] Or learning to play chess. I think I missed that particular round.

AJ: [00:05:26] I did that. I actually ran the chess club at the classical school where I worked.

Courtney: [00:05:31] There you go.

AJ: [00:05:31] I love chess. I teach that whether it's good for anything or not just because it's fun. But yes. That was... The reason we were able to get that in there so easily is that all the parents went, ooh. Chess. Critical thinking.

Courtney: [00:05:42] They tested it, because, you know, scientists test things. And none of those panned out for general critical thinking skills. There's a problem. And the problem is that different academic and non academic disciplines have their own steps, their own goals, their own standards, their own ideas about what makes something true. And it's part of what makes movies like *The Cutting Edge* so funny. I don't know if you all remember this, but it was a hockey player who had to transfer into learning to figure skate, and it was hilarious. And he would forget the toe pick every time. Because someone who's a master of one discipline cannot easily transfer those skills to another discipline.

[00:06:24] Or, in my case, I don't really get fine art. It's baffling to me. And part of that is because I'm ignorant. I don't know enough about fine art to judge it properly. And there are real and huge differences between novices and experts in terms of the way they think about problems. By the way, this is chapter one in *How Learning Happens* by Kirschner and

Hendrick. While there are some general rules for critical thinking. Willingham gives the example of the law of large numbers, ie the larger the sample size, the better the estimate, and most people kind of get this, but we fail to apply it.

[00:06:58] For example, teachers may assume that students who do poorly in the first term of the school year are not good math students. But you know, really, that's usually only one or two tests. The sample size simply isn't big enough to make a valid judgment. So people just fail to apply these critical thinking rules to new real life situations.

[00:07:17] Teachers can help. There are a couple of things you can do. And so Willingham mentions showing students how to compare seemingly different but really the same situations, and you can have students label each step of the problem solving with the goal. And this is, by the way, for those of you who learned how to do formal geometric proofs, remember? You have the problem on one side and the principle on the other. Same deal.

[00:07:42] However, the best way to teach critical thinking is to empower students with lots of knowledge about a given area, so they can chunk memorized smaller solutions together to assemble a new problem and use less of that valuable working memory. So they have more mental space for problem comparison. So for example, if you have to change the brake pads, you have to remove the tire before you can change the brake pads. And you can chunk in this whole tire removing process as one chunk. This is how you remove the tire.

AJ: [00:08:16] When you said that we need to give students lots of knowledge about a given area. Well, isn't this exactly what we were talking about the last time? We need a knowledge-rich curriculum and what you just said about chunking, we need that to be coherent, and sequenced in a way that makes sense for that subject.

Courtney: [00:08:34] He says that researchers have been unable to identify general thinking skills associated with increased academic learning. So just because you went to school for you know, 15 years and got yourself a PhD does not mean that you have good problem solving skills. Or, even for that matter, they've been unable to identify specific critical thinking skills associated with that increased academic learning.

[00:08:57] But he does lay out a four step plan for teaching specific critical thinking skills, and you know what they all add up to? A good curriculum. But number one is identify what's meant by critical thinking in each domain. So be specific by focusing on tasks that tap skills and not

skills themselves. So for example, a key critical thinking skill for science is understanding the relationship between a theory and a hypothesis. You don't want to have kids rattle off the definition of a theory, the definition of the definition of a hypothesis—you want to make sure they can put those to work.

[00:09:31] Number two, identify the domain content that students must know. So domain knowledge is a crucial driver of thinking skills. What knowledge is essential to the type of thinking you want your students to be able to do? Even if you want to free form it, not choosing is still making a choice. You're choosing not to plan. And when you do that you are not thinking coherently about what you want your kids to be able to do.

[00:09:57] Number three. Educators must select the best sequence for students to learn the skill. And this is I think kind of what you were getting at there, AJ.

AJ: [00:10:04] Right.

Courtney: [00:10:04] It's obvious that skills and knowledge build on one another in math or history. And it's equally true of other domains of skill and knowledge. We interpret new information in light of what we already know. And Willingham goes on to continue to say that we have to decide which skills should be revisited across years.

[00:10:24] And then he cites a study, which I hadn't seen before, and I think it's kind of interesting. He says that even if content is learned really well over the course of a half a year, about half of what your kids learn will be forgotten in three years, which, kind of, I can see that. But that doesn't mean there's no value in exposing them to the content. They'll forget it, but they'll remember some things. But if you actually want to firmly teach something and have it go long term, you should plan on at least three to five years of practice.

[00:10:53] And I thought that was really interesting, because my older daughter did swim team for a long time. And the coach said that I should not get my hopes up first couple, three years, that it takes about five years for a novice to become a good swimmer for swim team swim. And she was right. It took about five years for Gwen to be good enough to be competitive at swimming.

AJ: [00:11:14] And I can vouch for that with foreign language study. And with music. Definitely with instrument and even vocal training, three to five years sounds just about right, yeah.

- Courtney: [00:11:22] So it's across domains here.
- AJ: [00:11:24] This is why, although I say to people, any Latin is better than no Latin, if you actually want to do something with Latin beyond learn vocabulary roots, it's a long term project. You really do need to get kids through, I would say, at least four years for them to actually gain enough knowledge to have it mean something.
- Courtney: [00:11:43] So this is why I think it's so critical to be real clear and real specific about what you want your kids to study and what you want them to get good at, because it's a big investment in time and money for curriculum and directing your child's efforts. That's a lot of work.
- Jen: [00:12:01] If you're talking about unschooling, it's a huge gamble you're taking with your child's complete education. I just don't think that most parents see it that way.
- [00:12:10] What happens in unschooling is that children become specialists. And so they may get that three to five years in something that they are interested in. But then I have found that they are completely oblivious about other subjects and even well intentioned unschooling parents who will do everything and buy everything to support that subject of interest, those kids run into trouble in college. Even if they had had a cursory background, let's say, of American history, that would have made that college US history class just a little bit more doable.
- Courtney: [00:12:47] Mm hmm. The other thing is that I think it's underestimated exactly how much time and money you have to invest into unschooling to really support it well. The parents that I know that do unschooling really, really well spend thousands and thousands of dollars and hours and hours and hours to do it and have their children come out on the other end with a good education. And I, frankly, have neither the time nor the money.
- Jen: [00:13:12] It's definitely not the fastest way to educate. You can't sit down and just get it done every day by concentrating on an hour of this and an hour of that, an hour of the other thing. People think that it's just easier and that kids will learn whatever they need to learn. I've had parents say to me, listen, I'm an adult and I can't do geometry and I'm fine. That's a gamble, because you don't know if your kid decides to be an engineer and then they're trying to cram in four years of high school math in one year so they can go to college, you've essentially handicapped that child, if in fact, your intentions were to let them reach their passion.

Courtney:

[00:13:48] I hired a babysitter for Gwen when she was little. This person had been unschooled for most of her life. She decided she was stuck in a dead end job in her 20s. She decided she wanted to go to college. She had so little academics that she could not pass the TASC, which is what we use here for the GED. Even when she studied for it, she could not pass it. She couldn't earn a high school diploma. I felt terrible for her. Oh, kids will teach themselves whatever they need to know whenever they need to know it? Maybe not.

[00:14:19] I also want to point out that you can work super hard and do a fantastic job. The perfect curriculum. Give your kids all kinds of exhaustive domain knowledge and make sure they can do all of the skills, revisit them every few months and have all this knowledge at their fingertips, but none of it does any good if our children don't use the skills. And there are a whole set of cognitive biases that turn off our thinking brains. For example, there's the present bias. Here's a real clear example. If you ask somebody, "Do you want \$150 today or \$180 in a month?" Most people will choose \$150, which is a bad decision, because obviously it's a 20% rate of return. And if you ask them though, if they'll take \$150 in a year, or \$180, in 13 months? They'll choose \$180. We're biased towards that present reward. Really interesting how brains work.

[00:15:24] Or the gamblers fallacy, right? Oh, I got heads up five times in a row so the sixth time absolutely must be tails. But in fact, the odds are still 50-50. Or the anchoring effect. So I don't know if you've ever had to do salary negotiation. But the first rule of salary negotiation is that you never ever want to be the person who first mentioned a hard number because you're stuck there.

[00:15:49] Or the sunk cost fallacy. So I don't know if you've ever watched What Not to Wear. Go ahead, throw out that terrible and expensive pair of jeans, because you're not going to wear them. You've lost the money, move on. Or the normalcy bias, which is the refusal to plan for a react to a disaster, which has never happened before, which I think is basically our whole reaction to the pandemic this year. Or the fundamental attribution error. And we see this all the time. Oh, he's such a nice guy. I love him. There's no way he could have said that or done that or acted like that. But many of us do act like that when pressured by external factors. We're literally different people in different social situations, I find this absolutely fascinating.

[00:16:34] Or the bias blind spot, oh, I am a very rational human, I don't make decisions based on emotion. Which is a way of saying that you're better than everybody else, right? The Lake Wobegon effect in action.

Or projection bias, the assumption that everyone else's thinking is the same as your own. Of course, everybody thinks that. What do you mean, they don't think that? That's not just something that people say? Yeah, I ran into that last week.

[00:16:58] So then there's confirmation bias. And I think this is probably the most damaging in terms of trying to use logical, critical thinking skills. And that's the effect that leads us to look for evidence confirming what we already know, to view this as further confirmation or to discount or ignore any piece of evidence that seems to support an alternate view. And this shows up in some really bad decisions. And I quote, "When confronted with evidence that indicated Iraq did not have weapons of mass destruction, analysts tended to discount such information. Rather than weighing the evidence independently, they accepted information that fit the prevailing theory and rejected information that contradicted it." And this is from the official military report on the decision to invade. So there you go.

[00:17:47] Now if this kind of thing is interesting to you, I highly, highly recommend Thinking, Fast and Slow by Amos Tversky and Daniel Kahneman, and Priceless: The Myth of Fair Value by William Poundstone, as well as the counters against cognitive biases, like the ideas in The Checklist Manifesto by Atul Gawande,

Jen:

[00:18:11] That is awesome. Good stuff. I want to look up all those books. As usual, I'm here to present practical applications and precedent after homeschooling parenting for so long. Basically, I feel like every week my anecdotes support the science that Courtney and AJ so intelligently quote, for me.

[00:18:28] Critical, deep thought is hard won and in my opinion only achieved when you get the student heavily invested in the subject matter. Now that subject matter, if you are classically homeschooling, is going to be a set curriculum. And as the teacher, you have to figure out how to make that enticing. Now, that said, I'm not jumping around and making you know, cartoons, and I'm not making video games, but I do try to make sure that each child has a text or whatever kind of learning format that helps them to check off my list of things you must know to graduate from our homeschool.

[00:19:06] A lot of people gravitate towards those critical thinking workbooks, and there are so many of them. I mean, we talked about the idea that Latin will help you have critical thinking and the idea that chess would help you have critical thinking, well, there's a lot of curriculum marketed where there are logic puzzles, pages that could be taken from

the ACT. And this starts maybe in second or third grade in some of the workbooks that are marketed. And while they do raise your test scores, because practicing anything will make you better at it, I don't think it helps your critical thinking. I think it helps teach kids how to game the test and I think that homeschool students don't get as much practice test taking. So while they are useful for that if you're in a state where you have to take a standardized test every year or every other year to show progress, you don't want your child's first experience to be on the test that counts.

[00:20:05] But I don't think that you should count on it teaching critical thinking.

Courtney: [00:20:09] I bought, from The Critical Thinking Company, one of those, I think was this critical thinking workbook, one of those big, thick blue ones, you know what I'm talking about? And I was really surprised when I opened it up, because what it did was basically work your child through the assessments on an IQ test.

AJ: [00:20:28] Yes.

Courtney: [00:20:28] Which is fine. I mean, if that's what you're into, and you feel like your kid needs to get admitted to the local high school's gifted program or whatever, go for it.

AJ: [00:20:37] Or Mensa, for that matter,

Courtney: [00:20:40] Right. You know, whatever floats your boat. But, Jenn, I think you're onto something. Don't rely on that in your home school to teach critical thinking skills. That's not what that is meant for, really,

Jen: [00:20:52] It's not going to translate into real life. I mean, [we] throw our kids into the deep end. I mean, we give them actual real life projects, we're assuming that at some point, they're going to be adults, they're going to live somewhere. We think that everyone should know how to do things.

[00:21:10] We're not raising them necessarily to be handymen and handywomen, but can save a lot of money if you know how to fix your own faucet. We routinely will say... one of the kids comes to us and says this is broken. We'll say "Well, why don't you start taking it apart and see if you can figure it out?"

Courtney: [00:21:27] I love it.

Jen: [00:21:27] And they'll watch YouTube and most of the time, they will figure out how to fix things. There's really nothing better than that for critical thought, right? Because if you take apart that faucet and you're trying to figure out why when you twist it, it doesn't turn on. You take it apart, and they see the mechanism. And they'll see that—oh, I don't know what any of this stuff is called because I'm not a plumber—but you know, this part hooks onto this part, which pulls this and it's not pulling anymore. You can't really get any basic for critical thinking than that you're looking at an actual part of something that you use every day, and you're figuring it out by yourself.

Courtney: [00:22:01] In other words, you're giving them hands on manipulatives.

Jen: [00:22:04] They know how to do just a whole slew of other things. Nearly all of them completed a full classical education.

AJ: [00:22:12] I think it's also good to point out that just because you're doing classical education doesn't mean that your kids can't get their hands dirty, we can have all kinds of different skills that are not just sort of abstract things.

Jen: [00:22:23] Having the plan gives you freedom to have time to do other things.

Courtney: [00:22:27] That is one of the things that I really like about it right now for my children, is that, yes, we do academic things, and we get it done. And then they have the rest of the day to pursue their own interests.

AJ: [00:22:39] One other aspect of teaching critical thinking that often comes up in the classical homeschooling world. And that is instruction in logic, logic as a subject. This is something that I've taught. I've taught both formal and informal logic. And I do think that it helps improve how kids approach certain kinds of questions. In other words, specifically, the kinds of questions that comes up in formal and informal logic curricula. I do think this is something that should be part of every student's secondary education. I would love to see logic be more broadly taught.

[00:23:11] The problem, though, is that most of the issues that are really up for debate in our broader culture are not things that can be decided on purely logical grounds. Aristotle was quite clear, for example, that formal logic was not there to determine ethical issues, or even practical political issues. It was there for questions that could be answered yes or no. Is this true or is this false, where there's no gray area, and that's not most of what we have to deal with in the world. So it becomes a little problematic because sometimes you encounter classically educated kids

who have been told that logic is the key to clear thinking and that (if they have studied logic, and particularly if they've been raised in a rigid worldview, and that could be a religious one, or even an atheistic one,) that they are going to be able to convince everyone of their position. They will be able to hand capital T, Truth, to those people out there, wherever they are. They're often really flummoxed when they realize that most people won't even entertain an argument if it doesn't match their existing beliefs. And this is where what Courtney was talking about earlier with various cognitive biases comes in.

[00:24:18] So this is part of the reason that I personally prefer to teach logic in the context of rhetoric, because logic alone is only going to persuade a tiny minority of people in a tiny subset of situations. The rest will be swayed by emotions, specifically fear and flattery. This is Aristotle. He was right about this. That's an ugly truth, but it's something that our young adults really need to come to terms with, if they're going to be effective communicators, let alone agents for change.

Jen: [00:24:43] Now, what would you recommend for rhetoric for high school?

AJ: [00:24:45] Me.

Jen: [00:24:45] I'll just send Declan over.

AJ: [00:24:47] In terms of published curricula, Classical Academic Press probably has the most accessible one. It's a little cheesy. They teach logic and rhetoric separately. This is why I'm recommending myself.

Jen: [00:24:59] Okay.

AJ: [00:24:59] Simply because teaching logic in the context of rhetoric, to me, is more practical. But it doesn't take up full years of middle and high school. Textbook Rhetoric Alive, that is worth having. It does have some Christian content. But it is the kind of thing that you can skip over fairly easily.

Courtney: [00:25:16] AJ, you put a lot of work into that.

AJ: [00:25:18] Yeah, when I do a tutorial, it's always going to be created specifically for the student.

Courtney: [00:25:22] As an aside, I also want to point out that even when we think we're being logical, even when we think that we're using our critical thinking skills, very often, we're not actually doing what we think we're doing. A while back, I read a Harvard Business Review in which they

mentioned a study of people who had had the left and right hemispheres of their brains severed in order to prevent future epileptic seizures. This is a drastic step that doesn't happen very often. But scientists were able to deliver a message to the right side of the brain to go to the water fountain down the hall and get a drink. And after seeing the message, the subject would get up and start to leave the room.

[00:26:02] Scientists would deliver a message to the opposite, the left side of the brain, asking where you going? Now remember, the left side of the brain never saw the message about the fountain. But did the left brain admit that it didn't know the answer? Instead, it totally made something up. A rational reason, something like it's cold in here, I'm going to get my jacket.

[00:26:21] So we can and do lie to ourselves unconsciously. And so it's really important that we recognize that we are much more emotional than we actually think we are. We'd like to think that we would all be Spock. We would use our logic. But the real question, to quote Emmet Asher-Perrin talking about Star Trek, is, "How do both logic and emotion inform my ability to live ethically and kindly and with compassion?" That's the trick.

[00:26:54] Thanks for listening to Good Enough Homeschoolers. Before we go show some love for your favorite podcast by leaving us a review, then stay tuned for next week where we will show some love and hate for another curriculum.