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Sold a Story

Transcript

Season 2, Episode 5: Why It Works

Previously on *Sold a Story* …

(Music)

> **Zig Engelmann:** They wanted to know how many repetitions it took for kids to learn something.
>
> **Kurt Engelmann:** He just was entranced with instruction and having kids learn.
>
> **Lorraine Killion:** She would point to something in the book and then she would give a signal and the students would respond. And I thought, "Gee, I don't know what I think about that. It seems too structured for me."
>
> **5th grader:** "Beware MacDuff. Beware the Thane of Fife."
>
> **Gene Glass:** I find no evidence that they have anything special or worthy of wide distribution.
>
> **Zig Engelmann:** That was one bitter-ass pill.

(Music ends)

Zig Engelmann had spent much of the 1960s and '70s trying to prove that Direct Instruction worked. As far as he was concerned, he had done it with Project Follow Through.

But the education establishment remained unconvinced. Direct Instruction wasn't catching on in schools.

So Zig turned to parents. He figured if the system wasn't going to use what he'd learned about teaching, maybe parents would.

In 1983, he wrote a book called *Teach Your Child to Read in 100 Easy Lessons*.

> **YouTube:** Hey mamas, and welcome back to our channel.

Parents are still talking about the book on YouTube.

> **YouTube:** I've used this book from start to finish three separate times.

It's sold more than a million copies.

> **Mother:** So what was the new sound that we did yesterday ….
> **Child:** N
> **Mother:** It was the sound for "n." And what's that sound?
> **Child:** Nnnnn ….

Zig was hoping the book would create political pressure — that parents would see what their kids were capable of and start demanding more from their schools.

But he didn't want to spend his time on politics.

He wanted to spend his time writing more Direct Instruction programs to teach more things.

And improving the programs he already had.

> **Zig Engelmann:** We want to find out where our assumptions were incorrect, where the kids need more practice and the program needs revision. Because that's what we can change. That's what we can fix.

Zig approached his work kind of like an engineer. Treated every program he wrote — every lesson, every line of the teacher's script — as something that could be taken apart, tested and improved.

And after years of doing that, he thought he'd figured out why some instruction works. And some doesn't.

(Music)

He decided to lay it all out in a theory.

We use the word theory in everyday conversation to mean a hunch, a guess.

That's not what Zig meant.

He meant a formal theory. A complete explanation of how effective instruction works.

Remember, he'd been a philosophy major when he was in college. He wanted to understand the ideas of the big thinkers.

And now he had some big ideas of his own.

I'm Emily Hanford and this is Season 2 of *Sold a Story*, a podcast from APM Reports. We're at Episode 5.

In this episode, I'm going to tell you about Zig's theory. What he thought made Direct Instruction effective.

I'm also going to tell you what other researchers have learned about the effectiveness of Direct Instruction. There have been hundreds of studies since Project Follow Through. Direct Instruction is now one of the most researched education programs out there.

And there's another body of research that's relevant. Cognitive science — research on how people learn.

That science was still relatively new when Direct Instruction was first being developed.

But a lot of what Zig and his colleagues built into their programs lines up remarkably well with what cognitive scientists later figured out.

(Music ends)

We're starting with Zig's theory of instruction.

He developed this theory with his colleague Doug Carnine.

> **Doug Carnine:** We did not sit down and say — oh, now we have a theory. It was like a light that's on a dimmer where you gradually increase the light until, finally, we got to the point of — you know, we know enough and it's important enough, we should do this ridiculous book.

It's 482 pages. The size and weight of a college textbook.

With sentences like: “If we follow the stimulus-locus assumptions to their conclusion ....” You get the gist.

The book is called *Theory of Instruction*.

It's technical. It's complicated.

And it lays out a central idea.

The idea is that a teacher can communicate something so clearly that students will learn what you want them to learn.

Zig and Doug had a name for this.

> **Carnine:** Faultless communication.

Faultless communication is not easy to achieve.

I'm going to take you through an example.

With something as seemingly simple as teaching the color red.

(Music)

You could hold up a red apple, point to it, and say, “This is red.”

The problem is, a red apple is not just red. It's also round. It's in your hand. It's something you can eat. It's a lot of different things.

So, if you hold up a red apple and say, “This is red,” you can't be sure that “red” is what your students will learn. You need to show more examples.

> **Carnine:** You might have a red apple. And you might have a red firetruck.

So now you're showing your students two different things that are both red.

But that's not enough. They also need to know what's not red.

So, you show the kids the red apple again. And also a green apple.

> **Carnine:** And you point to the red apple and you say, “This apple is red.”

And then you point to the green apple and say:

> **Carnine:** This apple is not red.

So now the kids are seeing the same object. Different color.

By choosing examples this way, you've isolated the thing you want your students to pay attention to. You want them to pay attention to the color.

And here's something important.

When you're teaching the color red and you show kids the green apple, you say, “This apple is not red.” You don't say, “This apple is green.”

> **Carnine:** You don't want to confuse the learner by trying to teach them another color at the same time. All you're trying to do is very clearly teach the concept of red.

(Music ends)

Now, the color red is a relatively simple concept. But according to Zig and Doug's theory, the same principles apply when you're teaching things that are more complex.

You might be teaching kids how to sound out a tricky word. Or identify the subject of a sentence. Or solve an equation.

You have to be really clear, so kids learn what you're trying to teach them.

But you can't teach kids everything. There's not enough time in the school day for that.

And you don't need to teach kids everything.

You need to give kids a foundation, so they can learn things you haven't taught them.

Marty Siegel: It's about giving that kid the power to go beyond.

You met Marty Siegel in Episode 2. He worked with Zig. Marty remembers a moment when he watched a kid go beyond what he'd been taught.

Marty was working with a first grade teacher who was learning how to do Direct Instruction.

Siegel: This teacher was doing a math lesson.

The kids were being taught that two sides of an equation have to be equal. The teacher was writing a problem on the board.

Siegel: And the principal walked in, which made the teacher a little bit nervous.

And instead of writing six minus four on the board, the teacher wrote four minus six.

But she hadn't taught her students about negative numbers yet.

Siegel: And she called on a kid to come up to do this. As soon as the kid came up, the teacher, she saw her mistake. And she started to change it, and I interrupted and I said, “Let's see what happens.”

(Music)

The teacher stepped back. And everyone watched to see how this kid was going to deal with four minus six.

The kid looked at the problem. Repeated what he'd learned about equality.

Siegel: Something like as many as you count to on one side, you have to count to on the other side.

And the boy started doing the problem. Subtracting six from four.

Siegel: He said minus one, minus two, minus three, minus four. Pause.

He'd gotten to zero. He'd never gone below zero before. But he still had two more to subtract.

Siegel: And he kind of shrugged. And he said, minus five, minus six. And he just put a little minus sign after the two. He created his own notation. He wrote two minus.

He figured it out. He used what he'd been taught to get to an answer. He made a little discovery.

Kids figuring things out on their own. You've heard that before.

That's the goal of discovery learning — for kids to become independent learners.

Zig wanted kids to become independent learners too.

The disagreement was about how kids get there.

(Music ends)

And this is where cognitive science comes in.

That's coming up. After a break.

**

(Music)

Carl Hendrick has spent years writing about how cognitive science can be useful to teachers.

He started out as a teacher himself. A teacher who knew very little about cognitive science.

> **Carl Hendrick:** I really had almost no idea of how learning happens.

He was teaching English to middle- and high-school-age students in London.

He wanted to get the kids in his classes thinking. Discussing ideas.

And he was trying to stay away from direct instruction.

> **Hendrick:** I just thought direct instruction was talking at kids, lecturing kids.

He's not talking about Zig Engelmann's programs here. He didn't know about those yet. He's talking about the general idea of teacher-led instruction. He wanted his students to lead the learning.

He came up with projects, activities, things for them to do.

But he says many of his students didn't have the literary background or historical context to get much out of these experiences.

Carl wasn't sure what to do.

> **Hendrick:** And it was probably five years into my career, I came across this body of research that very neatly explained why the kids in my class were struggling.

It was cognitive science — research on how people learn. And it was other educators who led him to it. This was around 2010.

> **Hendrick:** On Twitter at the time, there was quite a vibrant group of teachers who were discussing topics and ideas. And you would encounter ideas that, you know, you'd never heard before.

One of those ideas was about the difference between beginners and experts. And how beginners and experts have different needs when it comes to instruction.

(Music)

An expert already knows a lot about a topic. When they encounter something new, they have knowledge to draw on. They can connect the dots. Come up with insights and ideas of their own.

That's what Carl wanted his students to do. He wanted them to think like experts.

But they weren't. They were still beginners.

> **Hendrick:** You can't really connect the dots if you haven't got any dots.

(Music ends)

Hendrick: And one of the issues we have in lots of classrooms is kids just don't know enough stuff.

His students needed to know more.

And the cognitive science research he was reading kept pointing to the benefits of teaching things directly. Especially for beginners. And especially for certain kinds of knowledge.

Hendrick: We can think about two types of knowledge.

The first type of knowledge is stuff that doesn't require instruction.

Hendrick: Learning to walk, learning to talk, learning to recognize faces. These are things that we're just evolutionarily hardwired to do.

But then there are things we are not hardwired to do. Like — learning how to read.

Hendrick: Learning to read is a relatively new entity in our evolutionary history. We've only been reading and writing for probably 6,000 years. And so that is what we might call biologically secondary knowledge. And you are not hardwired to learn those things naturally.

We don't just pick up reading. We need instruction. That's what Season 1 of this podcast was all about.

And reading isn't the only thing that requires instruction.

(Music)

Math. Science. Literature. History. All of that is biologically secondary knowledge.

And here's the thing — kids come into school with different knowledge. Some kids don't know their colors.

Other kids can already read.

Carl says that's why in schools that are full of kids from affluent families, student-led learning might be fine.

Hendrick: If you're very privileged, you can kind of afford to do very kind of funky ways of teaching and learning because the kids already know loads of stuff. When you get to schools where kids don't have lots of knowledge and more disadvantaged backgrounds, you don't have the benefit of doing that.

This doesn't mean advantaged kids don't benefit from direct instruction.

What matters here isn't a kid's background. It's how much they already know about what they're learning.

And we're all beginners when we're learning something new.

(Music ends)

So, cognitive science provides reasons to think Direct Instruction should work.

But does it actually work?

To answer that question, you have to put Direct Instruction into schools and collect data. Measure how much kids learn. That's what Project Follow Through did.

And by the early 2000s, there was a lot more data on Direct Instruction.

Doug Carnine had a big pile of it. He was a professor at the University of Oregon and he was thinking about all that data when he bumped into a colleague.

Carnine: When I ran into Jean, it just came to me — “Aha, here's another avenue to bring research to the forefront.”

Jean Stockard had no background in education. No connection to Direct Instruction.

She was a quantitative sociologist who had spent most of her career studying inequalities in health and wellbeing.

And she was getting ready to retire from teaching.

Jean Stockard: I saw Doug and he realized I was cutting back on teaching. And he said, “You know, we could use some help looking at data.”

Doug wanted an outsider's point of view on what it all added up to.

Stockard: And so I said, “Oh, that sounds like fun.”

Jean says for a quantitative sociologist like her, a big pile of data is like a trip to the candy store.

(Music)

Jean started with what Doug had.

But it soon became clear there was more. Lots of studies of Direct Instruction. Studies Doug had never heard of.

Jean recruited some graduate students to help her find it all.

Stockard: Tim was the one who had to go into, like, these dusty, dusty spider-ridden places to get out things. And then we had these very sweet librarians, these interlibrary loan people digging out things.

They were trying to find every study ever done on Direct Instruction.

Stockard: There was a ton of research, just many, many articles and studies that had been done over fifty years.

And not just in the United States.

Stockard: There was one dissertation written in South Africa we weren't able to locate.

But other than that, they were pretty sure they'd found everything: 377 studies.

Now came the bigger question: what did all these studies say about Direct Instruction?

(Music ends)

Stockard: What we were interested in looking at was — how well does this program work? Do the kids really learn? How does it work compared to other programs? Does it last over the long term? Are there certain conditions under which it works better or doesn't work better?

To answer those questions, Jean and her colleagues decided to do something called a meta-analysis.

It's a way to make sense of a big body of research.

And as it turns out, the person who developed the modern method of meta-analysis is someone you heard earlier in this podcast.

Glass: The best education starts with the interests, the motivations, the curiosity of the children.

Gene Glass. The guy who told us he does not like Direct Instruction. And helped write that critique of Project Follow Through.

He came up with the meta-analysis to solve a problem. Different studies of the same thing were sometimes coming to different conclusions. A meta-analysis combines the results of several studies to see what the evidence shows overall.

Now Jean Stockard was going to use that method to take another look at Direct Instruction.

(Music)

Jean and her team went through all the studies they'd found. They excluded some for things like poor research design. Took the more than 300 studies that were left and calculated what is known as an "effect size."

An effect size is a number that can tell you how much of a difference a program made. The bigger the number, the bigger the effect.

The result for Direct Instruction was striking.

> **Stockard:** The program was incredibly effective. And more effective than other programs by a long shot.

The average overall effect size for Direct Instruction across all the studies was .56.

That might not sound like a big number. But it's a big number in the land of education and effect sizes. Researchers generally consider an effect size of .25 to be educationally significant.

Direct Instruction's average effect size was more than twice that.

(Music ends)

> **Stockard:** I was of course so worried that we weren't right on this. We'd go back and check it. We'd recheck it. We'd try it again. And still got the same results.

The results were strong across subject areas. Math. Reading. Spelling.

And that language program too. Remember what the language lessons sounded like at Zig's preschool?

> **Teacher and kids:** This is a spoon.
> **Teacher:** Let's hear you say it, Sam.
> **Boy:** This is a spoon ….

Lessons like this might sound mechanical and relentless to you and me. But Jean's analysis showed that kids learned a lot.

Other things in the data stood out too.

(Music)

> **Stockard:** There was only one study that had a significant negative effect.

When researchers are looking at hundreds of studies, they expect some negative results. Jean was surprised there weren't more.

And then there were the long-term results.

> **Stockard:** You would expect effects to fade over time, but somehow it didn't.

Several of the studies tracked students for years. In some cases, from elementary school all the way through high school. And students who'd had Direct Instruction were still doing better.

That kind of staying power is unusual. A lot happens to a student as they move through school — different teachers, different classes. But years later, the Direct Instruction advantage was still there.

And Direct Instruction worked for all kinds of students. Not just kids in special education. Not just kids in certain racial or ethnic groups. Not just kids from low-income families.

(Music ends)

Who the students were didn't seem to make a difference.

What did make a difference was how well their teachers were trained.

> **Stockard:** They did well, and better than other programs, even if the teachers didn't do very well or their schools were sort of sloppy. But if the teachers were really well-trained and knew how to do it and felt comfortable doing it, the students did even better.

In fact, Jean's analysis showed that Direct Instruction could have a powerful effect on one of the biggest and most stubborn problems in American education: the achievement gap.

That's the difference in average academic achievement between kids from poor families and their higher-income peers.

What her analysis indicated is that when Direct Instruction is done really well the gains can be as large as that gap.

In other words, Direct Instruction has the potential to erase the achievement gap.

(Music)

Jean Stockard had come to the research on Direct Instruction as an outsider. She spent years reviewing the evidence. And she came away convinced.

> **Stockard:** Education is just an absolutely key element of promoting a more equitable society. We know that when students are taught with Direct Instruction, they consistently do better. So, we should follow that. We should use that.

But most schools don't.

There are schools that use Zig's programs in some classrooms, with some groups of kids. Like in special education.

But it's rare to find a whole school using Direct Instruction.

> **Teacher:** All right my friends, we're going to sound this word out.

We went looking.

> **Teacher:** Get ready.

And found some.

> **Teacher:** This word is book. What word?
> **Kids:** Book.
> **Teacher:** Sound it out. Get ready.
> **Kids:** Book.
> **Teacher:** Good job, friends.

Next time, what Direct Instruction looks like in a school today. And why so many schools that start using it … stop using it.

(Music ends)

That's on Episode 6 of *Sold a Story*.

(Music)

We would love to hear from you. Tell us what you're thinking as you're listening. You can email us or send a voice memo to soldastory@apmreports.org. Or leave a message at (612) 888-7323. That number and the email address are in the show notes.

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