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Sylvia Martinez:

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Vicki Davis:

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VICKI: Happy Though Leader Thursday. Today we have with us Sylvia Martinez, @smartinez my favorite tinker and co-author of [Invent To Learn](#). So Sylvia, as we think about tinkering, you know, there are a lot of teachers who say, "How do I find time to tinker?"

SYLVIA: Hi Vicki, you made me smile, that's great. Time for tinkering, now, that's a tough one because we know time is a precious commodity in schools. I think what we're doing is playing off the natural tendency of children to want to dive deeply into things and then giving them time to do it. We all heard about interactive design, we want kids to have a second change to do things. And by finding that precious time, we can do it. One way to do it is to stop trying to frontload so much, let the kids mess around a little bit even if it's messy, even if you're not sure if they're going to the point. But give them a little bit of time to play with materials before diving in.

VICKI: Okay. But Sylvia, here's the thing about tinkering is that what are we having students do? Some people could say, "Well, students are just messing around." I have this big Makerspace in the side of my classroom and somebody says, "Okay, what are they doing?" What do I say?

SYLVIA: I think that you want to combine thing that are skill-builders with more open-ended projects. You don't want everything to be open ended. **I think the idea that kids are just going to magically discover things by themselves is mistaken but the other side of the coin isn't to tell them exactly what to do all the time.**

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Combination of both of those things, I think, is really wise. We want to drive kids towards the big ideas of what we want them to learn and by choosing really interesting materials with interesting properties, the sort of low-floor, high-ceiling idea where kids can explore or a long time and get a lot of use out of the tools that we choose. I think that's a teacher's goal, is to bring those really interesting tools and interesting projects to kid's attention.

VICKI: And sometimes are just magnetic, you know Hummingbirds <http://amzn.to/2nHiV2m> – there’s just lots of things out there that the kids look out and they just immediately want to play, right?

SYLVIA: Yes. I think the Maker movement really has some interesting technology that sits at the intersection of digital and analog. The Hummingbird robotics kit that you mentioned is a great example of that. There are so many ways to work on the digital side, though programing, reading sensor data, processing data, sending commands out to the Hummingbird, and then you can have a great time playing on the physical side; building robots using craft materials and exploring the aesthetic since, the mechanical side, the engineering side and all of it coming together in something that’s fun and playful.

VICKI: I love the fund and playful because kids do play. But then that takes us to the next part of this, of assessment. I mean, how are we going to take this and say, “Okay, I have to give a grade?” And you’re like, “Oh my goodness, we’ve learned so much. But I do I quantify it?”

SYLVIA: Sure. I’m not unrealistic pie in the sky. I understand that we have to give grades and we have to figure out how the kids are doing in school. I think, though, anything you can reduce the amount of assessment that happens after the fact, the assessment, that’s a teacher’s judgment and increase the kind of feedback that you get from building something that you want to work.

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So for example, if we’re having a project and we were going to handcraft some soluble electronics, you don’t ‘nee the teacher to walk behind you and tap you on the shoulder and say your LED light is not on, D+, right? You don’t need to turn that in at the end of the week and say it didn’t work. You know whether it works or not. And with your own eyes and with your own hands you’re making split-second decisions about, is it working? Is it working good enough? Does it look the way I want it to? Do I want to change it? Do I want to make it better? Those split-second decisions are the engineering design process. And I think when we give kids time and beautiful materials we can’t stop them from diving deeply and making aesthetic choices.

Everyone talks about steam – and it’s only because we artificially remove the arts from science and math that we’re not trying to stick it back in. And tinkering, really, I think gives kids a chance to pull all that together.

VICKI: I love to have kids reflect in the media of their choice. You could type it, you could write it, you could podcast it, you could video it. Because when you have them reflect on their process of learning and also, “Okay, we started off doing the project this way and then we changed it that way” you can actually see the design process happening.

SYLVIA: Well, sure. Especially when the reflection is authentically integrated with the task. You want to write the steps to how to build a machine because you're actually going to put it online and share it with other people. You want to then make it better. It creates authentic moments for reflection. I don't want to undermine kids who, maybe, don't think that way. Maybe you don't think a lot about how you thought through something. And that doesn't mean that you couldn't make something good. So I think a balance of all of those things is really important.

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I think that tinkering is a way of knowing with your hands and your heart, not necessarily with your words and you can see what kids are doing and you can see that they're approaching materials playfully or thoughtfully. And that's the part of the teacher's job to reflect on that and how that connects to the bigger assessments and standards that we want them to learn.

VICKI: So Sylvia, what do you think the biggest mistake teachers make when they get ready to start tinkering and making in their classroom?

SYLVIA: Well, the biggest one I think is not doing it. Being afraid of the mess and thinking, oh well, first I have to write handouts and then I have to prepare samples and then it never happens. I think the other thing is wondering if kids who show frustration are really learning. Do kids just give up too quickly? And that can be just simply everybody with their hands up, "teacher, teacher, what do I do next?" Well, we've trained them into those kinds of things. And it's hard to not answer questions, it's hard to not give kids information while we know the most efficient way to do things.

But classrooms aren't there for teachers to show off how efficient they are, they are for kids to learn. And maybe it's a little inefficient and it might be a little painful to watch when you know there's a better way but not helping. You know, not being mean. I'm not saying be mean to kids or hide information, but letting them be a little frustrated, letting them try something and say, "How did that go for you? What are you going to try next?" And letting them come up with the answer instead of constantly telling them what to do next.

VICKI: And that's so hard that I even had it in my classroom today. I mean, they were trying to pick project managers on this app design project and they were like, well, how can we do this? And I'm like this person made a poll and that person did something else.

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And they said, well, "Just tell me how to do it and show me." And I'm like, "No, think." And they were so frustrated like, "You're the teacher" and I'm like, "But you're the learner."

SYLVIA: Right. I guess the good news is we've trained them to sort of respond this way which means we can un-train them. It takes patience, it takes time, they might not trust us that we're going to sort of say, "Syke! There's a pop quiz" at the end of the day when I promised that the project would be the assessment. I think that when there's trust and respect between the teacher and students, between the students as peers, they can start to look at each other as experts instead of always looking to the teacher for answers.

And that's part of – I think the maker movement really has an interesting idea about the whole world being your colleague, being your peer that you can put answers out into the cloud and somebody out there is going to have an answer or maybe the same question as you and you can work on it together. And taking that and bring into the classroom, I think is healthy.

VICKI: Well, remarkable teachers, we talked about being remarkable but I'll say this. If you're not making and if you're not tinkering it's kind of hard to be remarkable because that's where kids really ignite and get so excited and learn. And it really becomes contagious. So I hope you'll consider tinkering.

And, also, Sylvia has agreed that we're going to be giving away her book, Invent To Learn. So check the show notes and follow that information so you can retweet the show to enter the contest. <https://gleam.io/l4HWF/invent-to-learn-book-giveaway-contest> So get out there and tinker and be remarkable.

Thank you for listening to the Ten-minute Teacher Podcast. You can download the show notes and see the archive at coolcatteacher.com/podcast. Never stop learning.

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