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SARAH HANSEN: Today on *Chalk Radio,* teaching about sustainability in a sustainable way.

LIZ POTTER-NELSON: When we think about education of a different kind, it's not that what we're doing is all wrong and bad, but it's that we could be doing things better, and we could be finding ways to embrace sustainability through a ton of different avenues in our classrooms.

SARAH HANSEN: I'm Sarah Hansen. For this episode, I sat down with two educators from MIT's Environmental Solutions Initiative. These educators helped create open resources for bringing sustainability into the classroom.

SARAH MEYERS: My name is Sarah Meyers, and I'm the education program manager at ESI.

LIZ POTTER-NELSON: My name is Liz Potter-Nelson, and I just finished up as a postdoctoral associate in Environmental and Sustainability Education with ESI.

SARAH HANSEN: Can you just tell us a little bit about what the Environmental Solutions Initiative is?

SARAH MEYERS: Absolutely. ESI is really MIT's effort to mobilize the knowledge and research and education across the institute so that it doesn't belong in any one department. Many of the problems that we see in sustainability are interdisciplinary problems, and you need people from different disciplines coming together to work together to solve things. So ESI is really MIT's effort to leverage the best of the best from across the university.

SARAH HANSEN: Climate change and environmental challenges are huge problems with massive implications that affect all of us in different ways. While working together at ESI, Sarah and Liz spent a lot of time thinking about how to address the broad spectrum of issues that climate change and environmental disruption pose through the lens of sustainability. So before delving into the details here, let's first get clear on something. What even is sustainability?

SARAH MEYERS: First of all, if you ask that question to a hundred different people, you'll get 200 different answers, as far as I can tell. So technically, sustainable development is defined in the Brundtland Report from 1987 as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. That is a very anthropocentric statement, I think. It doesn't include things like other species or things like the environment itself. But even if we just start with that, it is very, very broad.

It isn't just recycling. It is not just turning off your lights. It is not just climate change. If you look right now at the sustainable development goals of the UN, there are 17 of them. They include things like education and women's rights and no poverty and partnership between institutions. It's very broadly defined.

You cannot imagine a future without understanding human behavior, without understanding the impact of what we have already done to this planet, the impact of histories and culture to a people. You can't just walk in somewhere and say, we're going to change the planet.

SARAH HANSEN: Both Sarah and Liz spent time teaching before working at ESI, Sarah as a high school math teacher and Liz as a high school science teacher. They both became interested in sustainability through different lenses, which really brought home their point about sustainability being fundamentally interdisciplinary.

LIZ POTTER-NELSON: Building from Sarah's explanation about sustainability, where we're looking at solving wicked problems that are connected socially, economically, environmentally, sustainability scholars and sustainability education is really looking at how to create people who are sustainability literate. There are people who have the knowledge skills and dispositions to live sustainably.

SARAH HANSEN: I've been in education for a while, but this term, sustainability education, was new for me.

LIZ POTTER-NELSON: What a lot of people are arguing in the literature is that our current education systems support unsustainable behaviors. And so really, when we start to think about education, we're thinking of education that now starts to promote sustainability. It starts to, as Sarah mentioned, not only look at our current needs as people, but needs of future generations. This can happen in a lot of different ways. It could be as an instructor finding ways that you increase the conversations around sustainability in your classroom.

So it could be talking more about carbon capture and different sustainability ideas, talking more about the science of sustainability or the social impacts of making decisions. It could also start by looking at how you are teaching and finding ways that you can embrace student-centered active learning in the way that you're teaching. A lot of the literature is starting to say that it's not just talking about sustainability that's important and teaching students about sustainability that's important, but it's how you're actually modeling it and teaching that within the classroom.

There are ways that fundamentally, when we start to unpack things within the education system, there are parts of it that are oppressive to certain people. There are parts that are-- we have a colonialized education system in its foundation. And so if we really start to get at the root of sustainability, it starts to also call into question some of those systemic things that are preventing people from accessing that education or living their culture within our education system. So when we think about education of a different kind, it's not that what we're doing is all wrong and bad, but it's that we could be doing things better, and we could be finding ways to embrace sustainability through a ton of different avenues in our classrooms.

SARAH HANSEN: To help teachers bring sustainability into their classrooms no matter what subject they teach or what levels, Sarah and Liz created the Sustainability and Climate Change Across Learning Environments project, also called SCALES.

SARAH MEYERS: The Sustainability and Climate Change Across Learning Environments project, SCALES, is meant to leverage all of the resources from across MIT classes and provide them to teachers wherever they are, wherever they may be. And they can use them as open source. So they can use them as they like. They can adapt them.

At a deeper level, where we'd like to see this go is that it actually becomes a repository and a resource for teachers, not just for MIT curriculum, but for any of this kind of curriculum that might be similarly related. And so we went back to the OCW archives was the first place we looked at classes that we knew had climate or sustainability content to say, can we make this publicly available for teachers?

So this is actual problem sets and lecture notes and ideas. But then to give a little bit more support, like Liz was saying, well, how do I teach this? What does it mean to teach with sustainability?

LIZ POTTER-NELSON: Any classroom teacher that you talk to has heard that they should be using active learning or student-centered learning or using groups or participatory learning. So it's not necessarily new, but it's really connecting now those fields of education and best practices in education with sustainability so that hopefully we can start to address some of the larger sustainability questions and problems in the world, knowing that climate change is real. And how do we start preparing students and generations to start tackling those problems?

SARAH HANSEN: SCALES incorporates six pedagogical practices. Each is meant to foster this multidisciplinary holistic approach to sustainability education. There are so many great ideas for educators to consider incorporating into their teaching. Here's a quick breakdown. First, there's collaborative small group learning.

LIZ POTTER-NELSON: Students work together in groups of two to roughly six students to solve a problem together.

SARAH HANSEN: Then there's inquiry-based learning.

LIZ POTTER-NELSON: Students are starting to ask questions and work to answer their questions.

SARAH HANSEN: Experiential learning.

LIZ POTTER-NELSON: Things like going on field trips, having guest speakers in, doing internships, other types of hands-on learning experiences.

SARAH HANSEN: Service learning.

LIZ POTTER-NELSON: Where you have students who are engaging with their community and providing a service experience within that community.

SARAH HANSEN: Place-based learning.

LIZ POTTER-NELSON: Place-based learning often has students going out into the community and learning about their place, learning about the geographical place that they're in, their local community government.

SARAH HANSEN: And finally, culturally sustained learning.

LIZ POTTER-NELSON: Culturally sustained learning starts to really look at how students are able to embrace their cultures within the education system. It's built off of culturally responsive and culturally relevant learning. And so the idea in this is that teachers are finding ways within their curriculum to let students not only embrace their culture but then also expand on their culture.

And so culturally sustained learning has been building. There's things like hip hop pedagogy that fall under it. But for me, a lot of the way that I see this presented in the materials that we've looked at is really in teaching practices and how we help students recognize their own unique cultures and help them start to advocate for themselves in their education setting.

SARAH HANSEN: Along with these pedagogical practices, SCALES also outlines competency areas that define sustainability literacy. These are things like systems thinking, social justice, active citizenship, and futures thinking.

LIZ POTTER-NELSON: I love futures thinking because it doesn't happen very often in our classes, but it's this idea of, what does this look like in the future for future generations? And when I say it doesn't happen a lot in our classrooms, what I really mean is in Western society, it doesn't happen a lot in our classrooms. We don't often think about what the impacts of what we're doing will be for our grandchildren's generation and their children.

And so that, I think, is really an interesting thing to do, and there's some really fun and unique visioning activities that you can do, where you can say, let's revision our downtown, and what does that start to look like? But it starts to really help people see how their choices have impacts in the future.

SARAH HANSEN: Just thinking about teachers, you've both been teachers. It is a ton of work just to even set up a classroom and arrange the desks and create a grading system and communicate with parents and make sure kids have lunch and food. And then they're like, I cannot add one more thing to my to-do list. What is your response to them?

LIZ POTTER-NELSON: So the goal isn't to throw out what you're doing, but it's to make small changes to what you are doing so that that way, you can start to embrace sustainability. I used to be a former chemistry teacher. So maybe you have a problem set, and you have some random chemical equation. Maybe you put in the chemical equation for smog for that one instead and start to loop things like that in.

Then maybe the next change you make the next year is that instead of just having that chemical equation for smog in there and students are doing their calculation, they get something about carbon dioxide out of it. It's starting to draw these little changes in connections. It's not throwing everything out. It's not intentionally trying to add one more thing in. It's recognizing the good that you're doing and then finding small places to make it even better.

SARAH MEYERS: Teachers are lifelong learners. They really are. It's not like you learn to teach, and then you're like, all right, I'll do this for 40 years. Teachers continuously go back for professional development to improve their craft forever, even master teachers. This just builds on that. We're not saying you can no longer teach chemistry. It's that we know that students are going to be more engaged when they see real-world connections.

So let's figure out a way to do more of that and to do that better. So it's not replacing what you do, but it's enhancing what you do. And to me, this makes perfect sense. If you're a teacher who's still teaching the exact same thing in the exact same way 10, 15 years later, you're probably bored. You probably want something different. And it's supposed to be a way in.

SARAH HANSEN: If you're a regular listener to our podcast, you'll know how much we at OCW love it when teachers use our materials and remix them for use in their own classrooms. That's one of the main reasons we exist. And when Sarah and Liz created SCALES, we were so excited to share this with the world. Part of what we love about it is that it's really designed to make that process of remixing as easy as possible.

They did this specifically by providing open resources from across MIT's curriculum in adaptable and editable formats. So that's going to make it really easy for you to use these materials. We'll end the episode today with some advice for instructors who want to incorporate SCALES or other OCW materials into their classrooms.

LIZ POTTER-NELSON: The biggest thing is trust yourself as an instructor. These are some really awesome materials and tools that worked for an instructor. But now, it's figuring out how to make them work for you. So it could be something that you could immediately give to your students, or it might be something that you might need to give them a little bit more background information on or something that you might want to take a little bit further.

Most of the material is geared at the undergraduate level, so it might be something that if you are working with a freshman or sophomore in high school that you might need to provide some more scaffolding to or adjust the assignment just a little bit. The other piece of that is you, as the instructor, know your students academically and emotionally. Some of the topics can be a little bit heavy for some of your high school students or even some of your college students.

And so I think even putting on that lens of talking about climate can trigger strong emotions in everybody. And so just making sure that as you work to remix them that you're also cognizant that you're providing those supports because you, as the instructor, have an awesome wealth of knowledge. And you can easily use these. You just need to trust yourself and go with it.

SARAH HANSEN: If you're interested in teaching with the SCALES materials, you'll find them on our MIT OpenCourseWare website. You can also go right to scales.mit.edu. You can follow Sarah Meyers and her work at the MIT Environmental Solutions Initiative website. Liz Potter-Nelson is now an assistant professor of physics and science education at the University of Maine at Farmington. You can follow her work there. I'll share all these links with you in the show notes.

Thank you so much for listening. Until next time, signing off from Cambridge, Massachusetts, I'm your host, Sarah Hansen, from MIT OpenCourseWare. MIT *Chalk Radio's* producers include myself, Brett Paci, and Dave Lishansky. The show notes for this episode were written by peter Chipman. The SCALES offering on MIT OpenCourseWare was published by Alicia Franke. Be sure to give us a follow on Instagram, Twitter, and wherever you get your podcasts.