Inspired Education – A Student's Vision

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First off, I just want to thank Professor Larson and everyone here at LINC for inviting me to talk to you guys today about a topic that I'm really excited by. My name is Sam Shames, and I'm a rising senior studying material science and engineering.

We've all heard a lot over the past few days about using online education to better engage students and to produce active learners with 21st century skills. I want to talk with you all today about how I became that type of student through project-based learning, and about how online education creates an opportunity to extend this type of learning to all levels of residential education. The title of my talk is, "Inspired Education – A Student's Vision."

I grew up in Newton, Massachusetts, which is 20 minutes from MIT and went to Newton North High School, a regular public school. I had a number of wonderful teachers during my four years there, but the one that inspired me the most was Steve Chinosi. Among other things, Mr. Chinosi taught a class called Senior Year Project. SYP was a project-based research seminar where students withdrew from their regular classes in order to pursue an independent semester-long research project on a topic of their choice. Senior Year Project was the first class that inspired me, and it changed the way I thought about education.

During the first part of Senior Year Project, my classmates and I learned advanced research methods. We learned strategies for finding relevant information from primary and secondary sources, how to write a literature review, how to prepare for and execute an interview, and how to communicate our findings effectively. At the same time, we were also preparing for our independent inquiries and getting comfortable with the expectation that we would take ownership over our education and learn independently.

For my Senior Year Project, I proposed to study the efficiency of a type of biodiesel processor called an Appleseed. Although I knew very little about biodiesel and had never done any sort of project like this before, I was excited by the idea to learn something new and also by sustainable energy. Because I had never learned independently before, I had moderate expectations for my project, but I quickly discovered how much I enjoyed the freedom to learn about a topic that excited me in any way I chose.

Driven by my enthusiasm, I not only researched the efficiency of different type of Appleseed processors, but I also designed and built my own Appleseed using a $500 grant which I won from the Newton Conservators. I wrote a 25-page research paper about

my project, presented my work both informally to an audience of my peers and before a formal committee, and I maintained an online Wiki where anyone could see my progress and learn about all the work I'd done. I blew my expectations out of the water and walked away with a newfound appreciation and enthusiasm for learning.

Through Senior Year Project, I learned to set goals and to work independently to complete them. I developed grit as I struggled to complete my project and build my machine. I remember exactly how excited I was the first time I turned on my finished machine, and then how frustrated I was when I saw it leak immediately afterwards. But despite all the obstacles I encountered, I refused to give up because I cared deeply about what I was doing. It was a level of perseverance I had never experienced with a traditional assignment.

Most importantly, Senior Year Project gave me the feeling that I could learn anything. After all, I told myself after my project is finished, if I can become an expert at biodiesel, there's no reason I can't take the same series of steps to become an expert at anything, be it programming, architecture, or engineering. I developed a sense of self-efficacy and gained a confidence that has helped me excel here at MIT.

Equally as important is that my experience with Senior Year Project was in no way unique. In Senior Year Project, I watched students become passionate learners who had basically slept through four years of high school and who had never engaged in a traditional classroom. Senior Year Project turned my classmates and I into inspired students by asking us to challenge ourselves far beyond what we ever did in a normal classroom.

Unfortunately, though, most students never get this opportunity and never get the feeling of inspiration that transformed my classmates and I. I imagine a world where the classroom is a place of wonder and joy, where all students are transformed by what they see and given the freedom to discover just what is possible. I imagine an education system centered on classes like Senior Year Project, where students work on problems they care about and the learning process transforms them into passionate problem solvers.

This transformation is being made possible for the first time because of new technologies that are being developed for online education and digital learning. Technology-enabled education will help students discover a potential that too few reach in today's classrooms. The real power of online education comes from changing the role of the teacher and empowering the student.

Through resources like MITx, Khan Academy, and even Wikipedia, students today have access to concepts and equations that were once exclusive to teachers and textbooks. This means that teachers no longer need to spend class time lecturing, and can instead focus more on the magic of the interpersonal, where we know so much of the learning happens. I imagine using MITx to develop something like a digital concept library where, instead

of presenting material in a rigid structure set by a teacher as in a traditional class, or even a MOOC, all material and concepts are always available, ready for students to mine for the specific project or application. This platform enables active learning because it gives students responsibility for finding and sorting the relevant material, and also allows them to design their own learning pathways.

The digital concept library has different levels of structure and can be thought of as a multiverse. At the highest level are the universes, subjects like physics and biology, but also interdisciplinary areas like energy and robotics. Inside every universe are the different galaxies, representing sub-disciplines like molecular biology, statistical mechanics, or microeconomics. Inside these galaxies are solar systems, each of which contains a different topic related to a sub-discipline like DNA replication, entropy, or the chain rule. At the lowest level, within each solar system are the planets, and each planet represents a different way of learning a key idea. The planets could be videos, lecture notes, books, interactive demonstrations. The goal is to have as many different types of content as possible reflecting the diverse learning styles and individualized needs of every student.

The digital concept library offers a whole set of learning pathways and gives the individual the opportunity to choose the best one for his or her needs. In many cases, the learning pathway is determined by the application or project a student is studying, but larger, more complex problems may offer multiple learning pathways. The virtual library could use arrows to represent connections between the different planets, solar systems, galaxies, or universes. This format highlights the relationships between different topics and helps students design efficient learning pathways for their project.

This virtual library is only one possible model for organizing online content in such a way that it's accessible to all students. Any model that offers a centralized source where students can find and sort all the information they have traditionally gotten from teachers and textbooks will work. Such a platform will enable widespread adoption of project-based learning, ensuring that students spend less time figuring out where to find information and more time interpreting and applying it for their needs. The platform gives students a chance to take control over their education and puts them on a road that can take them anywhere they want to go.

Another way online education enables project-based learning is through innovations in assessment. In Senior Year Project, every student had to maintain an online project portfolio, which anyone could look at and see both what the student had learned and on what stage of the project they were. The benefits of the e-portfolios, for student-driven demonstrations of learning, as I sometimes like to call them, is that they give students an active role in showcasing what they've learned, giving them the freedom to demonstrate their learning in a way that is meaningful to them and fits into the context of their project and learning goals.

Online education makes project-based learning possible at all levels of education in almost every subject. I've experienced firsthand how this model of education empowers and inspires students. The challenges to widespread adoption are both technological – the creation of something like the digital concept library – and developing new pedagogies. Education is among the most powerful forces in the world, and I doubt there is a better social equalizer. The opportunity is to utilize new technologies and digital learning to reinvent residential education, equipping students with the 21st century skills to solve the world's toughest problems and inspiring them to become lifelong learners. Thank you.