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# Introduction

Have you ever stumbled across an idea or a seemingly random event that caused you to rethink the very essence of what you thought was true? I had just such an accidental insight, one that challenged my concept of the roles of learner and teacher and upended my understanding of the structure of schooling. It happened in 1981, when I was the director of an alternate school within Lexington High School, in Lexington, Massachusetts. It was the last Friday of the school year, and I had been summoned to discipline a student who was caught breaking into the school's computer lab. Nothing was stolen or broken, but the lab was part of my school and Gary was one of my students, so it was up to me to handle the incident.

Gary's crime mystified me. Yes, I understood his interest in computers, although I didn't share it—at that time, I thought computers were just dead machines filled with lines of code. But Lexington High School was a hotbed of computer science in the early 1980s. Many parents were in the computer industry along the Route 128 high-tech corridor, and Logo, the computer language developed for young children by the famous MIT computer scientist Seymour Papert, was piloted in Lexington. It was an amazing time and place, and educators from around the world came to watch our innovative classrooms. I wasn't surprised, therefore, by Gary's curiosity about computers. But why break in?

This student had never enrolled in a programming course (the only type of computer class offered at the time). He had shown no previous interest in technology and, in fact, had demonstrated little interest in school at all. He wasn't a troublemaker, but his performance was mediocre and his attendance record even worse. So why, after all of his friends had bolted from school for the freedom of summer vacation, had Gary broken back into a locked classroom, just to spend hours hunched over a keyboard? That was just one of the questions I intended to ask Gary as I entered the computer lab to confront him about his break-in.

"What have you been doing in here?" I demanded as the first salvo in my riot act. Gary pointed at the computer screen before him, and then began scrolling through screens full of computer programming code. He said, "I've been writing a program." I had no idea what I was looking at, but I could tell Gary was proud of his work. I also could see that this student hadn't broken into the lab to vandalize it; he had snuck in to work on his self-taught programming skills. He broke into school to learn—not to earn credits, advance toward graduation, or gain teacher approval or praise. I had never seen a student so motivated, so self-directed, and so perfectly driven to learn (perfect except for the breaking and entering, of course). With that realization, I stopped thinking of ways to punish this student, and began thinking about how I could reward his drive. I was intently focused on helping all of my students to graduate, and I certainly didn't want to lose this one. I asked him, "What do you think about attending summer school and earning academic credit in a programming class?"

“I can’t come to school this summer,” he said. “I have a job as a mechanic at the Saab dealership.” Then he added, “If you let me take a computer home for the weekend with all of the assignments for a programming class, I’ll finish the work and bring it in on Monday.”

Gary’s suggestion seemed almost rude—an idea that defied the very structure of education as I knew it. He was going to complete an entire course in a weekend, with no teacher to direct him? I found the idea hard to swallow but decided to take a chance. I arranged for Gary to go home that day with a computer and a semester’s worth of assignments from one of our programming courses. On Monday morning, Gary met me back at the school building to return the computer, along with all of the completed assignments. His perfect work earned him a C for the course—the highest grade he could earn without attending any classes. Clearly, the grade was not an accurate reflection of Gary’s brilliance as a self-taught programmer. But Gary didn’t care about the grade. He had taken incredible joy in setting his own goals and solving his own problems.

That experience completely changed my understanding of student motivation, the role of educators, and the potential for student-directed learning. It also made me realize for the first time that computer technology might have truly broad implications in the educational process. As Gary explained, the key to his success was that the computer provided him with immediate feedback about how his program worked (or did not work). Gary felt that he was fully responsible for the quality of his work (similar to the way students feel when they play video games). His observation of immediate feedback motivated me to try to understand how technology had the power to fundamentally empower students to own and lead their own learning. To launch that journey, I decided to design and teach my own computer course.

I began asking friends who were in the computer industry which programming language I should teach. One of my friends, a Harvard business professor named Roger Bohn, advised me to forget about programming. He told me patiently, “Software is coming. Very soon the whole concept of teaching programming will be outdated.” If I wanted to understand the impact of computers in learning, then I should focus on using them to develop skills that remain useful no matter how dramatically technology evolves. He said, “My advice is to teach your students to learn basic problem solving.”

And so, after a great deal of confusion, research, and revision, I developed a course called Community Problem Solving Through Technology. The course challenged students to identify a real problem in the community and find existing technologies that could help deal with it. I will never forget the meeting in which I presented the course outline to my department. My colleagues were as confused as I had been when I began my design journey, and the course focus on problem solving really threw them. They kept asking, “What kinds of problems will you give the students to solve?” and “What will your tests look like?” When I explained that my students would be responsible for finding the problems they would solve in the course, the response was universal: “It won’t work.” Eventually the department head came to the rescue and told my incredulous colleagues, “Let Alan develop his course. Let’s

see what he comes up with.” If the students succeeded, so would I; if they failed, so much for my idea.

From the beginning, the course attracted a large student enrollment; students who wanted to use computers without having to learn programming signed up. The Apple II had just been released, and the first databases, word processors, graphic programs, and spreadsheets were hitting the market. At that time, there were no computer courses (other than programming) that I could take to prepare for my own teaching. Everyone I knew was self-taught. It turned out that as long as the motivation was there, learning about those tools was a straightforward process; you simply had to pick up the manual and go. To supplement my learning, I joined the Boston Computer Society and attended evening meetings where various folks would share their knowledge of computer applications. It was all very informal and very social. High school and college students were often teaching the adults.

It was just natural to extend my own learning from high school students in the evening at the Boston Computer Society to how I would organize elements of the high school course I was preparing to teach. I knew it would be important to empower my students to “learn how to learn.” On the first day of teaching, I challenged my students to unwrap the cellophane on new boxes of software, pick up the manual, and go. I also encouraged them to learn from each other. Students were divided into teams to learn different applications. Students would then share their knowledge with each other. Looking back, this is really the only sane way I could have launched the first course so quickly. My students taught me a lot of the nitty-gritty details of how the software worked. It was a blast. My students enjoyed figuring out application tricks before I did. They loved teaching me, and I loved being taught by them.

The most difficult part of teaching was to guide the students as they identified a worthy community problem they could solve using the technology. While they immediately enjoyed learning how to use software out of a manual, they struggled with identifying their own problems in the community. I underestimated how unprepared they were for that task. One girl in first period summed it up: “Mr. November, *you* are the teacher. Giving us the problems is *your* job, not ours.” Imagine one of the worst fears of teaching, giving students a challenge with absolutely no response. It was a Ferris Bueller moment: “Anyone? Anyone?” My colleagues’ predictions of the impossibility of having students design their own problems were ringing in my ears.

To help break the paralysis, I invited various folks from the community into the classroom for student interviews. As these talks progressed, my class’s excitement for the project grew. All of my students eventually identified community problems that could be solved with technology. In the process, they brought me some of the most rewarding experiences I have ever had as a teacher. Most astonishingly, for the first time in my career, some students wanted to continue to work on their projects into the summer vacation! I even had students who recruited friends who were not in class to help them complete their projects. I started to see that Gary wasn’t alone; these kids loved working with technology. But I also saw that their drive was fueled by two important conditions: they wanted to have some ownership in the learning

process, and they wanted their work to have purpose—they wanted to make a contribution even if they initially struggled with the challenge of identifying their own problems to solve.

Looking back, I can see that my friend Roger was right; programming is a very small part of what we teach in schools today. What none of us could have foreseen thirty years ago, however, is the way technology would permeate every aspect of our culture today. We didn't know then that many students would one day have access to computers, cell phones, and the Internet all the time (not just in school). We had no concept of social media, which has become a major tool for business, a driver of political and cultural change, and a critical communication tool for people of all ages. We couldn't have realized then the creative (and destructive) potential these technologies would offer all young people. From immersing themselves in Facebook and Twitter, to writing their own apps, to creating avatars and designing websites, today's students demonstrate a huge interest in creating and sharing content. Socrates was right: learning, for many of our students, is a social interactive enterprise. This book is based on the premise that given the right opportunity, tools, and teacher guidance, students want an equal voice in directing their own learning. It is possible that the structure of school as we know it has underestimated students' willingness to own more of their learning.

If Gary were in school today, he would not have to break into a computer lab to follow his passion for learning programming. He would just go home and log onto iTunes U, pick up an apps design course at Stanford (for free), and join a community of programmers from all over the world to share design ideas. His teachers would probably be completely unaware of how he is designing his own learning environment beyond the reach of school.

As Roger also rightly observed, however, if you don't know how to organize and solve complex problems, computer tools won't do you much good. In recognition of that important truth, I've spent the past thirty years building upon the experiences I learned in that first computer classroom to develop an educational model based on critical problem-solving skills, a model that leverages the powerful motivators of student ownership and purposeful contribution, a model that builds real and lasting learning even as it enables students to create a learning legacy for all students who follow.

I wrote *Who Owns the Learning?* to tell you about that model, and to tell the stories of teachers and students who have applied its techniques to solve real-life problems and make contributions to their community. While sometimes overcoming huge resistance from a staid traditional system, these teachers and students have joyfully expanded the traditional boundaries of learning to add value within their own classroom and the world. You will read stories of pioneering educators who have an absolute belief in their students' knowledge and imagination, teachers who accept their students' unlimited willingness to contribute to community as a basic truth. These stories cover a wide range of subject areas, come from around the world, and illustrate various tools that educators have used to make their vision (and those of their students) come to life. At the heart of all these stories is the key concept

that students will work harder to achieve a purpose—designing a tutorial for their algebra class, for example, or a resource database for the handicapped—than they will for a grade. The people you will read about in this book are living examples of the educator John Dewey’s (n.d.) belief that “education is not preparation for life; education is life itself.”

Along with these stories, I’ve outlined a number of ideas for creating learning experiences that engage students by enabling them to contribute to the curriculum as well as to their community at large and, in the process, develop essential skills in problem solving, critical thinking, creative collaboration, and global communication. I call this approach the Digital Learning Farm.

## Why the Digital Learning Farm?

In the past, when family farms were dominant, children were an essential part of the survival of the family. They performed jobs around those farms—caring for animals, repairing farm equipment, preparing goods to sell at markets, and so on—that were vital to the success of the farm and of the family. As machinery became more sophisticated, families began to use machines to perform those jobs instead, and children were required to attend school to prepare for the industrial economy. By necessity, teachers in rural one-room schoolhouses had to rely on older students to help the younger ones. As we moved to graded classrooms, this *teacher’s helper* role was no longer needed once every student was on the same page in the same subject every day. We lost the value of children as contributors to the culture of school. Teachers became the central instructional figures.

The power of purpose and meaningful contribution has been missing from our classrooms and our youth culture for some time. While life outside our schools has changed dramatically over the past century, we cling to an early industrialized classroom model that often fails to encourage collaboration, innovation, a global work ethic, or critical problem-solving skills. Our students are caught in a process we call “cover the curriculum,” regardless of their mastery of the material. We have inherited an organizational structure in which the teacher owns and manages the learning. This industrial model underestimates the natural curiosity of students to direct their own learning; they have little opportunity to contribute to the design of the learning process or find a sense of greater purpose in their work. One high school student I interviewed summed up the traditional model this way: “The most important skill to have to succeed in school is a willingness to learn how to be taught.” Contrast this observation with the highly valued skill in the global economy of “learning to learn.” As Harvard researcher Tony Wagner shared with me, “The essential skill of the 21st century is knowing how to ask the most interesting questions” (personal communication, November 2011).

Today, very little of the work we give students in school provides them with a sense that they are making a contribution to anything other than their own educational progress toward graduation. Indeed, once the grade is recorded, a huge amount of student work is thrown away. It has no more value. Now that we have

powerful, easy-to-use design tools and a capacity for worldwide publishing, we have an opportunity to restore the dignity and integrity of a work ethic with redefining the role of the learner as a contributor to the learning culture.

Unfortunately, the opportunity that technology can bring to our students to help them lead their learning has not been leveraged. In too many cases, we bolt new technologies on top of current learning tools in the standard learning environment, which effectively means that we give our kids a thousand-dollar pencil. In other words, we teach students to use computers to create papers or do other work that could have been done without a computer. I have watched students in laptop schools simply use their devices to take notes while a teacher lectures. Too many of our elementary students are still memorizing the fifty state capitals when they could be building interactive digital maps of the history of state capitals.

The tools we have today can help us craft a new vision that empowers our students to own and lead more of their own learning. The goal of the Digital Learning Farm model is to redefine the role of the learner as a contributor, collaborator, and leader in the learning culture. In many of the examples in this book, you will see that teachers have given students one of the most powerful motivators of high-quality work: purpose. Imagine a school where every learner is valued for making a contribution to benefit the whole class. The questions (1) Who owns the learning? and (2) Who works harder in the classroom, the teacher or the student? drive the thinking behind the solutions described in this book.

The jobs we can create for our students can encompass everything from researching curriculum content to creating and publishing learning tools to collaborating with students and other content providers around the globe. As more powerful digital tools become available for free or little cost, the opportunities for our students to apply these skills will only continue to multiply.

In the Digital Learning Farm model, students supply much more of the creative design, preparation, delivery, and revision of the educational process, enabling teachers to spend more time in the roles of mentor, advisor, and facilitator. As a result, responsibility for the quality of the work shifts to the learners. Students can become more engaged in the learning process; they do more, they think more, and they learn more. They also have an opportunity to build their own educational legacy by creating content that will spur ideas for new learning experiences long after the original creators have moved on. Perhaps the most amazing transformation takes place in the classroom. Students work harder than their teachers. Teachers learn more about the learning styles of their students and have more time to individualize instruction. Many teachers report that the Digital Learning Farm model leads to a savings of the most precious commodity for teachers: time.

While traditional education doesn't emphasize the goals of contribution, purpose, and problem solving that lie at the heart of this model, these goals are in exact alignment with the skills our students need to thrive in today's global workplace and economy. Here are just some of the ways everyone wins with the Digital Learning Farm model:

- Students develop essential 21st century skills in empathy, self-direction, innovation, communication, and collaboration.
- Teachers gain more control over their time and can devote more attention to personalizing instruction.
- Student thinking becomes more visible to themselves and to the teacher.
- Parents gain better and more immediate insight into their students' educational progress and projects, and have more opportunities to view and experience student work.
- School systems gain access to proven technology educational programs without having to make major investments in new technologies. As you will see, most of the student work described in this book involves very little in the way of equipment and software, and even students without at-home computers and online access can participate.
- Society gains a new generation of lifelong learners with a strong work ethic, a critical understanding of how to use technology to solve problems, and a well-developed sense of global empathy that enables them to communicate and collaborate with people from any geographic area or culture in the accomplishment of tasks and goals.

The Digital Learning Farm model represents a shift of control. Much of what used to be teacher directed in the traditional model is powered by students in the Digital Learning Farm model. Adjusting to this kind of shift can be difficult. I met a teacher who told me he had adopted the model and his students were working harder than he was. Then he said something that stunned me: "I have to wonder if I'm earning my salary." I told him that if anything, he should be paid *more*. He had created a culture of learning that empowered his students to dramatically improve their work ethic and encouraged them to develop the habits of curiosity and exploration that mark lifelong learners. In the Digital Learning Farm model, the role of the teacher is more important than ever.

The revolution has begun. All over North America, pioneering teachers have led the way in implementing ideas that leverage the capabilities of their students to take a more active role in the learning process. In this book, you'll read about a number of these bold educators, including:

- **Eric Marcos**—His middle school students in Santa Monica, California, have energized their school through the use of podcast tutorials. These students record themselves solving problems based on material and methods they've discussed in their classrooms, and they then upload the videos to the web. Under Eric's leadership, these students have created an online library of video tutorials that can be accessed and used by anyone around the world.
- **Darren Kuropatwa**—He is a high school calculus teacher whose daily scribe program is just one way in which he has transformed his classroom into a collaborative learning community. In that program, one student is assigned on a rotating basis to take notes for everyone in the class. The

student scribe receives immediate feedback on the notes from Darren, and then posts the approved notes on the class blog for everyone to use. Struggling note takers improve with immediate feedback and practice, and students who never took notes in the past are now doing so, knowing that peers are depending on them.

- **Garth Holman and Michael Pennington**—They are middle school teachers from two schools in Ohio whose students collaborated to create an online world history textbook written *by* students, *for* students. The wiki is still collecting visitors and updated content from students around the globe.

As you read the stories of these and other educators, you will see that the processes and ideas of the Digital Learning Farm model revolutionize the role of every player in the educational system. Students take on the role of contributor and content provider, teachers become mentors who help guide the process and drive home the lessons it teaches, school librarians help students learn to navigate vast collections of information and even publish their own resources, and superintendents and principals support educational innovation and help lead the transition to new models of learning. My hope is that the ideas and techniques outlined in this book will help educators everywhere find their own opportunities for creating new examples of the Digital Learning Farm model in action.

## Getting the Most From This Book

*Who Owns the Learning?* is a guide as well as a collection of student and educator profiles. It's about ideas (some of which are already being put to use in classrooms) and the concrete methods and techniques any educator in any school system can use for implementing them. In the first chapter, I'll talk more about the Digital Learning Farm and the role of students, teachers, principals, and even school librarians in maximizing its success. Chapters 2 through 5 each focus on a specific type of work for students on the Digital Learning Farm—tutorial designer, student scribe, student researcher, and global communicator and collaborator—and look at examples of that work in progress. Each of those chapters will include these core elements:

1. **The Story**—These real-world examples illustrate how students are tackling and defining this type of work in classrooms across the United States and around the world.
2. **Tools and Techniques**—You can use these technologies to leverage this type of work in the classroom. I'll also include information about which packages are free, what commercial software is available, and how to set up and organize these tools. You'll also find essential information about classroom management, the pedagogy to accompany the software, and next steps for teachers and principals.
3. **Questions for Discussion**—I'll end each chapter with questions that can help educators and study groups explore the chapter topic and its role in implementing the Digital Learning Farm model, including questions