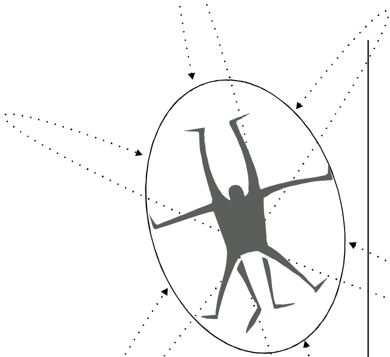
Learning communities: a tentative assessment



Richard E. Bailey
Henry Ford Community College

Richard E. Bailey teaches writing at Henry Ford Community College. He is also co-director of the HFCC's Center for the Study of Work. He has directed three National Endowment for the Humanities projects at HFCC and participated in a number of multi-disciplinary projects funded by the National Science Foundation.

Learning communities make connections across curriculum and provide students with enriched contexts for learning. In Michigan, learning communities provide a structure for integrating academic and career education at the community college level. Practitioners link content in specific courses and develop curriculum with the needs of local work communities in mind. This tentative assessment addresses the impact of learning communities at Henry Ford Community College, exploring faculty development, student performance, and institutional culture as critical issues in the College's initial experience.

This is how it works.

My physics colleague gives the cart a shove. It rolls down the track and collides with another cart. It's more kiss than collision. On the computer screen, this kiss produces a graph. It doesn't mean much to me, but Stan, my colleague, looks at it and smiles. He doesn't just smile; he beams. He traces the image on the screen lovingly with his finger and nods his head. "See that?" he says, pointing to the spike in the graph, "Isn't that neat?" We repeat the experiment a number of times. Each graph presents itself to him like a work of art, like a couplet in a poem.

I'm learning about the relationship of force and acceleration. "Most of our students," he says, "are Aristotelian in their thinking about force and acceleration." He shakes his head at their folly. He points at the computer screen and interprets the graph. His explanation goes into the cause/effect relationship of force and acceleration. I get it. But I'm Aristotelian too, and I lose it pretty fast. A hundred graphs later, maybe I'll have it. It doesn't matter to Stan. He is very patient with me.

I'm an English teacher in a makeshift physics lab at Henry Ford Community College (HFCC), a portable classroom that might better be described as a movable hovel. We have a work station with a computer, various apparatus for physics experiments. We have a blackboard. We have a laptop. Every so often, there is a clank and whir beneath the floor, as the furnace kicks on. In a far corner is a bathroom the size of a phone booth, with a chemical toilet. I have blue stains on my linen pants from the crowded flush. We've got a nice chunk of money from the National Science Foundation (NSF), and we're revising the College's technical physics class. The money pays for computers, software, and redirected time. Thanks to the NSF, I get to continue my education. I get to learn a little physics, enjoy long talks with people in the workplace, attend classes other than English. I'm getting out of my box, out of my discipline. It's frightening. And it's fun.

The learning community movement today, at least as it is straining to get started at HFCC, and as it operates at other community colleges in Michigan, is about training people for work. It's about changing the way we teach, making connections across curriculum, articulating programs with workplace situations, skills, and competencies. What do people need to know? We've spent a lot of time talking to the work community about this question. We get narrowly defined disciplinary answers. *Teach them Ohms Law and the Wheatstone Bridge. Teach them about kinematics. Hydraulics. Teach them to factor polynomials. Teach them grammar.* We get an array of broad answers. *Teach them to think on their feet. Teach them reading and writing. Make them flexible. Teach them to work in teams.* Teamwork is a stock answer. It is an idea that has taken firm hold in American thinking about work. But it is slow to take hold in academia.

Developing learning community curriculum means working in teams. There are practical difficulties here. Try to find the time. At HFCC, it's difficult to get three people together for 30 minutes during the week. We're talking about serious curriculum work here, multi-semester planning, then team teaching. That's where grant money comes in. It pays for time. If you're lucky, that's also where administrative vision comes into play. Five grants deep in this process, faculty are able to persuade HFCC administrators that learning communities are a good investment. The college is now providing faculty with time to form and work in teams to develop curriculum, one team each year. There are no new teams forming in the coming year.

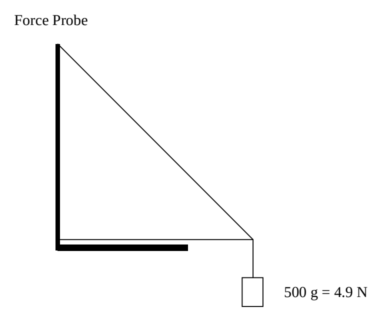
Working in teams means faculty must emerge from their safe, hermetically sealed classrooms and take a few risks. What kind of risks? Abandon the safety of prepared lesson plans. Admit that you don't know something. Work in a different building. Learn from another colleague. Fly by the seat of your pants, which is both thrilling and unsettling. Consider that one of your holy disciplinary cows might have to be sacrificed. Earn the suspicion and distrust of your more traditional colleagues.

Like the work community, college faculty are persuaded that working in teams is important for students to learn, but our institutional history and institutional culture present formidable obstacles to practicing what we preach.

Today's investigation is the vector nature of force. Stan's apparatus includes a force probe and data acquisition system, two steel rods, a 500 gram mass, and some fishing line. I am the surrogate student in these sessions. Two semesters before implementation, we are writing lessons for students. In carefully orchestrated labs, students will discover what a traditional physics teacher would convey in lecture. It's my job to test the procedures. It's my job to discover. I'm the guinea pig.

"What's a vector?" I ask again.

"A vector is a quantity that has direction and magnitude." Stan loves vectors almost as much as graphs.



The 500 gram mass has a clear direction—down—and a known magnitude—4.9 Newtons. The force probe is connected to a line that forms the hypotenuse of a triangle (as shown above). I see the direction of the hypotenuse—sort of down. My job is to predict the magnitude of the force on the hypotenuse. Will it be more than 4.9 Newtons, less than 4.9 Newtons, or 4.9 Newtons exactly? I don't know. I do what any student would do. I guess.

"4.9 Newtons," I say.

Stan clicks the mouse on the computer. The force probe reads 5.7 Newtons.

So I'm wrong. What's going on?

Stan asks, "Why is it more than 4.9 Newtons?"

Beats me.

We repeat the experiment, adjusting the apparatus so the hypotenuse is longer, then shorter than its original length. Each time, I make a prediction. Click, we confirm it. I begin to see the logic, without understanding exactly why. The hypotenuse is longer than the other legs of the right triangle. If the line is longer, the force is greater. This is vector thinking.

"Yeah," Stan says. "Now watch this."

He whips out a protractor. He can calculate the force on that hypotenuse line. I sense where we're heading—in the direction of right angle trig. Don't go there. Not yet. I'm not very good at right angle trig, and I'm just getting a feel for this vector nature of forces.

"Do we have to do the trig?" I ask.

"It's what we always do at this point," he says.

"But why do you need the trig when the motion detector tells you what the force is?"

"It's what we always do at this point," he says.

Learning in technical courses such as physics, electronics, and architectural construction frequently depends on prior knowledge of mathematics. A learning community links contents from different courses, identifies points of contact, and exploits opportunities to link instruction. In theory, this sounds wonderful. In practice, it is actually a huge challenge. How do we talk to each other about how and what we teach? Can we be honest? How do we get to know those points of contact? How do we arrange those opportunities to link instruction?

Each learning community we have developed at HFCC has begun with an immersion experience. Communications and math faculty learn physics, electronics, architectural construction. They audit a course. Faculty becomes student. Provided that you can make your peace with being ignorant, this is a powerful source of critical understanding of classroom practice. At any given point, you can say:

Stop. What was that again?

Wait a minute. I still don't understand.

Hold on. Do you have to move on so fast?

The faculty learner, as master-student, critiques tried and tested presentations. The faculty learner, as master-student, can say, "Don't do the trig now." It adds a layer of complexity. You're going to lose half the class. *It's what we always do at this point.* When the student says, But I just don't get it, our inclination may be to blame the student; when the master-student says, "But I just don't get it," our inclination may be to rethink the pedagogy.

The auto industry has implemented a manufacturing approach called just-in-time delivery. Rather than warehousing parts for weeks and months, and then retrieving them at the moment they're needed, which is an inefficient and ineffective process, companies arrange for parts to arrive at the assembly plant right when they're needed. Just in time. We trust students to warehouse their knowledge, if they bother to get it in the first place, and make use of it when it's time. This is an inefficient and ineffective process. We need something like just-in-time delivery in curriculum. The learning community makes that possible. A physics course is linked to a math course. Their syllabi are synchronized. At or around the time the student learns about the vector nature of forces in physics, she is involved in a thorough examination of vector addition and right angle trig in her math class.

In the learning community, everything is open to question, subject to multi-disciplinary scrutiny by people who know how to teach. The community is not only about linking; it's about teaching more effectively.

We've met with industry a number of times. We've fed them breakfast and taken them through a curriculum workshop. We've visited a number of workplaces and looked for ways of linking classroom inquiry to workplace activity. Our industrial advisors like the fact that we're listening to them. What do entry level technicians need to know about physics? What kind of technology do they work with? What kinds of problems do they solve? How do they report their results?

When we teach kinematics, we relate it to trunk lids opening. There is a certain acceleration, velocity, and displacement. Students go to the automotive lab and perform some actual tests to generate data for analysis. When we teach dynamics, we relate it to a car seat's headrest and the government standards for how much force it has to absorb at a certain velocity in a head-on collision. A headrest test is complicated to do in the classroom. For one thing, we need a car seat. We also need a pendulum assembly with a force probe inside. Can we do this?

"Let's talk to Bob," Stan says.

We call our contact at a test facility in Westland and ask for help.

We've been to this place. The technicians work for Ford. The last time we were there, we saw a car with 500 strain gages on it. They were taking it to China for a long bumpy ride over bad roads. (Haven't they been to Dearborn Heights?) They'll record data, then bring the car back and subject it to hours of real-time tests. Bob is proud of their work. He is a nuts and bolts guy who looks slightly ill at ease in a white shirt.

"I got just what you need," Bob says on the phone. "We just ran a test like that. Let me fax you some graphs."

Graphs. They're like gold. They are actual traces left from real workplace tests on headrests. Does the seat conform to government standards? Bob provides us with the standards, too.

We now have a test case for students. Their task is to learn some physics and apply what they learn to a true-to-life workplace problem.

Physics is a discipline with a long and interesting history. Like most introductory courses, tech physics (at least at HFCC) has tended to recapitulate that history. But what place does planetary physics really have in a technical curriculum? The learning community applies Ocham's Razor: the simplest course is the best one. Focus is all. We build redundancy into the course. Rather than learning many things superficially, we want our students to learn a few things thoroughly. So we revisit certain concepts over and over.

There is a violence here, the violence of birth or separation, as a learning community stretches its ties with its disciplinary parents. Tech physics for students in an automotive community still has to transfer. What happens when the student transfers to a four-year university? The math class must support learning in the physics or electronics or architecture class, but it must also stand on its own to prepare students for the next class. The composition course teaches writing in order to learn, writing the memo and letter, writing the report. It involves multiple opportunities for oral communication. But what if the student decides against a technical career and takes the next course, in non-technical writing? Can the student read George Bernard Shaw? Write about literature? Use the library? Write a research paper? What exactly are you teaching in this learning community? Are you still one of us?

First day of class, the students stop at the door, cast wary looks. Two teachers?

We take a survey to determine where these students are in their programs. Many of them have saved physics and English for the very end. It's not saving the best for last. Some are obviously horrified: physics and English together.

A few days into the semester, they see this is a new deal. There's no lecture, no down time. They have something to do every day. They're responsible for what they learn. They have to run the labs at their tables. They have to collaborate amongst themselves, propose solutions, figure things out. Stan's not answering questions, unless it is to answer a question with a question. Somehow, the students know better than to ask me. There are oral reports every day. *What was the problem? What did you do? What did you think would happen? Did your experiment confirm your predictions? What do you conclude?*

They take turns working on the computer. Each group has a computer hog, a student who knows more about MS Word and Excel than either Stan or I. We're grateful to have these students, but we have to do something about them. Everyone has to touch the computer. Each group has a retiring, reticent member. He has to take his turn at the blackboard, do his 90 seconds in front of the class. Each group has a member who works for Ford, or Great Lakes Steel, or SDS Defiance, or Chrysler. They are accomplished technical people who take to this environment with confidence and joy. There are students who like neat problems with one answer. They like carefully framed questions. Work is messy, we tell them. This class simulates the work environment.

They hate the writing. They love the writing. They know it's important and want to practice. At the end of each class period, they begin asking for writing assignments.

We can demonstrate, by the end of the grant period, based on pretest and posttest results, that students perform 25-50 percent better in this course than in the traditional course. It's a success, if that's how you define success. But the fact of the matter is, not everyone wants this course. The physics department doesn't particularly want it. They wanted computers. They got their computers and a course that might be so good, it's dangerous. It moves in the schedule from the 10-12:30 to 7:30-10:00 slot. Somebody's trying to tell us something. How do we define success?

Stan and I work so well together, we do an electronics community after physics. I discover I don't really like electronics. There are graphs galore, but no poetry like you get in physics. Originally we conceive an electronics-math-English learning community for high school seniors. Tech prep and school-to-work help us develop this idea. We can't enroll it. Then we conceive an electronics-math-English learning community for HFCC students. We can't enroll that either. Now we conceive an Electronics 110-math learning community, and an Electronics 120-English learning community. Our counselors are either baffled by the learning community idea or angry that they weren't consulted two years ago. The registrar says our antiquated computer system makes enrolling a learning community a nightmare. He's right. Three steps forward. Two steps back.

We've learned a great deal.

We've learned how to cross career and academic boundaries.

We've learned that the work community is ready and willing to talk about building alliances, and we've learned how to talk to them, and how to integrate what they say into our classrooms.

We've learned that linked classes and just-in-time curriculum delivery are good ideas.

We've learned that the college is not set up to enroll students in this manner.

We've learned that, while approving the idea once they get into a learning community, students defend their freedom to enroll in whatever they want, whenever they want. What if we made an assault on that freedom, requiring students to take their physics and their English when they need it, not when they happen to feel like it or when there's nothing else between them and graduation? My conservative estimate is that it would take five years to finish talking about the sequence issue at HFCC. Then maybe we could try it.

We've learned that this work is a marvelous staff development tool.

We've learned that if you wait long enough, the idea will catch on. We have twice as many people involved now as we did five years ago. We went from five to ten.

We learned to think small.