

Diversity in Learning

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Professor Seth Roberts submitted this article, which we've edited for length, to Ideas That Matter.

I was fed up with school. —Jane Jacobs, explaining in an interview why she did not go to college right after high school (May 2004)

At the University of California at Berkeley, where I teach, most classes are a mix of lectures, reading assignments, tests, and term papers. My classes were like that, too, until a few years ago I found a better way. This article is about that discovery and a theory that explains it.

No Bell Curve

After a recent school year I took Spanish lessons in Guatemala. “Who is your best student?” my teacher asked (in Spanish). I was surprised to realize the question had no answer: So many of my twenty-odd students had done outstanding work, and their work was so diverse, that to call one student the best made no sense. But I couldn’t say that in Spanish, so I named one student. “[Student X] is very smart?” my teacher asked. I was surprised again. The student’s best work had many impressive qualities—resourcefulness, creativity, good judgment, persistence, even courage—but sheer intelligence was not among them.

I had taught two seminars on depression. The work that had impressed me came from the term-project assignment, which in both seminars was the same: Do anything related to depression, so long as it is off campus (e.g., no library papers). It should involve about 20-30 hours of work. I mentioned some possibilities – give a talk about depression to



a high school class, volunteer for a suicide hotline, make a poster – but I stressed that almost anything would be acceptable. I met with a few students to help them figure out what to do, but beyond that I gave them little guidance or assistance.

Reading their reports at the end of the term was like opening presents. They were very diverse and full of emotion. What they learned was so often unexpected. A student with severe stage fright chose to give a high-school talk. Every step was hard, but finally it was done. “I walked out of the class [where she had given her talk] with a huge sigh of relief,” she wrote. “I was so glad that it was over . . . This was a very difficult, but rewarding experience. I was able to overcome my many fears,

and talk! . . . Have I changed as a result of this class project? In a way, I have. I learned that if I really wanted to, I could conquer my fear, and do what I have to do.”

Several other students also gave high-school talks. One of them, minoring in education, used the assignment “as a way of tying together all the different subjects I have been studying.” Piece by piece, she thought of attractive ways to present the information. I was especially impressed that she wanted to avoid giving lists (e.g., symptoms necessary for a diagnosis). She knew something about teaching I did not; I have presented lists countless times, without considering alternatives. Two other students, working together, constructed an elaborate talk that included a quiz, music, pictures

of famous people who suffered from depression, and PowerPoint slides. It did not have the expected effect; their students seemed bored. “Teaching students is definitely not an easy job, and trying to keep students interested is a constant struggle”—that was the main thing they learned.

Two students spent time at a care facility for the elderly, one hour per week for two months. They had planned to eventually give a talk about depression to the residents, but on the first day they found that most of them “were incapable of having a coherent conversation.” Something said in a psychology class led one of the students to try making “more physical contact with the residents, such

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as holding their hands or putting a hand on their shoulder when talking to them. This small change in our behavior made a huge difference in their behaviors. . . . By simply holding a resident's hand, they smiled more, answered questions, they seemed more aware of our presence and seemed glad to see us.” The students made a brochure about depression in the elderly and left copies on the front desk in the hope that a relative would pick one up—many of the residents were depressed. “To see how people with no power, independence, or resources live their lives is an eye-opening and valuable experience,” one of the students wrote. If these conditions were better known, “we wouldn't let people live like this.”

Three students attended support groups for persons with depression. Three students worked at a suicide hotline. One student constructed a small enclosure with an accompanying tape of words and music. Being inside the enclosure while listening to the tape

was supposed to evoke the experience of being depressed. Another student made drawings. Another interviewed religious leaders. Another led a discussion group of high-school boys. And so on. Not a dud among them.

After this assignment worked well with seminars on depression and also weight control, I wondered if the basic idea – give students a wide, off-campus choice of what to learn – could be expanded. I taught a class called Psychology and the Real World where the off-campus work essentially was the course. Students could do any off-campus work related to psychology – at least 60 hours of it during the 15-week semester. In addition, we met weekly for discussions and the students wrote three short

papers. Eight students signed up. Their off-campus work was learning how to be a mediator, developing a television

show about happiness, working at a shelter for battered women, working at a nursing home, talking with patients in a mental hospital for the criminally insane, taking care of two-year-old twins, tutoring high-school students, and making bereavement support calls.

It was time well-spent. In their final paper, the students wrote about what they had learned. “I have found that I really enjoy working with and helping people,” wrote one. This would help her choose a career, she said. Maybe such views were predictable (although not by me). Less predictable were these comments: “Another wonderful strength of learning outside the classroom is meeting other people with similar interests in a real world setting” and “there does not exist any type of [formal] learning like the contact between two human beings.”

The term projects and off-campus work seemed to draw on a little-known source of motivation: a student's desire to learn what he or she chooses to learn.

Economics as a Source of Human Nature

In the middle of these teaching discoveries, I thought of a theory of human evolution that helps explain them. The theory owes everything to the work of Jane Jacobs, in the sense that her work taught me economics.

Were two hedgehogs, or two grasshoppers, or two salmon to meet at a party, one would not ask the other, “what do you do?” Because they would already know. All hedgehogs make their living the same way. All grasshoppers make their living the same way. Homo sapiens is the only species in which different members of the species make their living in many different ways. I propose that our brains changed in many ways to make this possible.

1. Hobbies

The ontogeny of a new business, I believe, recapitulates phylogeny. A woman enjoys baking. She bakes more than she cares to eat. At first, she gives the excess to friends. Running out of friends, she discovers that a local store will sell what she makes on consignment. This is encouraging. She bakes more – in effect, she has a part-time job. She buys better equipment. She tests recipes. She places her work in stores farther and farther away. If successful enough, her part-time job turns into a full-time one. This sequence – hobby; hobby with small surplus given to friends; small surplus traded to strangers (part-time job); large surplus, traded to strangers (full-time job) – recapitulates the beginnings of our economic world.

To make this progression our brains changed in several ways. We can see these changes in various features of human nature not found in our closest ancestors.

The first difference between humans and our closest ancestors, the difference that led to all the other differences, was manual dexterity. Humans could make tools, use tools, and, especially, through long trial and error, make better tools. We were a successful species at the dawn of tool making. Tools made it pos-

sible to gather a day's worth of food in less than a day and thus provided free time. To make good use of that free time, our brains changed; we came to enjoy hobby-like activities. Hobbies are done intensively, year after year, for their own sake. They provide no economic payoff (the model airplane hobbyist does not sell his output) but we do them anyway. They usually involve a gradual growth of knowledge and skill. Often they involve making things. In Stone Age man, the "hobby instinct" slowly generated better tools, perhaps over hundreds of thousands of years.

2. Procrastination: Diversity of Singlemindedness

Tools, such as knives, within reach of prehistoric man had an infinite learning curve – with more practice, more trial and error, you could always do better. A knife could be sharper or have a better handle, for example. So it was better to stick with one tool, and plug away year after year making improvements, than to move from one tool to another. Moreover, it was better for the community if different people specialized in different tools. Diversity of single-mindedness was needed. Genetic diversity had presumably been optimized; to increase it would have been harmful. A new mechanism was needed to increase the diversity of hobbies (i.e., tool-making) among them. One solution was a mechanism that today causes procrastination. The usual experience, when you put something off, is that once you get started it is not so bad. The more you do it, the easier it becomes. The main cause of procrastination, I believe, is a mechanism that makes it more pleasant (and therefore easier) to do what you have recently done and less pleasant (and thus harder) to do what you have not recently done, recently meaning over the last few days. On Tuesday it will be easier to do what you did on Monday, and harder to do what you did not do on Monday. On Monday, purely by chance, Joe did X and Bob did Y. On Tuesday, this mechanism causes Joe to be more likely to do X than Bob and Bob more

likely to do Y than Joe. Thus random differences are magnified and diversity is increased. [Making procrastination a desirable trait]. Another force toward diversity of single-mindedness is a kind of network effect; the more you know about something, the more pleasant it is to learn more about it.

3. Friendship and Gifts

With almost all tools, one is enough. It may help to have more than one type of knife but owning two of the same type is little better than owning one. Taking into account the cost of protecting it, the second tool may be worth nothing. So if you become good at making a certain type of knife, it will be to your benefit to give extra copies away if you can get something – almost anything – in return, even if what you get is uncertain and comes much later. To promote this, a mechanism that encouraged friendship and reciprocity evolved. A crucial part of most friendships is a vague reciprocity: You give a friend a gift and eventually you expect some sort of payback. The reciprocity is vague because the value of the payback need not be close to the value of your gift and nor is there any clear time limit for repayment. Thus friendship supported economic development. Time spent becoming a better tool maker paid off not only with a tool for one's own use but also with gifts for friends – gifts that were an investment of sorts, because they would eventually be repaid with something that you yourself could not make.

4. Spoken Language

Tools begat more tools. Accumulated knowledge and a larger tool kit increased production rates – how fast a knife specialist could make first-rate knives, for example. And the number of useful tools grew. This exposed the limitations of friendship as a medium of

trade. Suppose a certain tool lasted one year and you could make five in a year. If you had ten friends, that was enough. They could absorb your entire production. Suppose however you could make 50 in a year. What should you do with the extra 40? Suppose there are only three other tools; with any luck you can get all three from among your ten friends. Suppose, however, there are 100 other tools; your ten friends are unlikely to be able to supply all of them.

Thus trading with strangers became worthwhile. Now the reciprocity needed to be immediate (because you could not be sure you would see your trading partner again) and precise (you needed to know exactly what you were going to get) because one cannot trust strangers to the same extent one can trust friends. Before language and money, trading with strangers was difficult. It was hard to find someone who (a) wanted what you had to trade and (b) had something of roughly equal value that you wanted. Spoken language solved this problem by promoting trade between strangers not

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only because it helped make the necessary connections but also because a common language implied other commonalities. With languages go customs. You had reason to believe that when offered a trade, a stranger who spoke your language would act as you would.

Nouns promoted trade in goods. Verbs promoted trade in services. Modern languages support this origin in at least one way: The largest portion of words in a dictionary describe man-made things that are traded (cup, bowl, hat, etc.). Only a tiny fraction (e.g., hot, tree, smile, mother) describe things or activities that predate technology. English and other languages make it

easy to distinguish thousands of different chairs (tall blue comfortable sleek wooden chair, etc.), distinctions that facilitate trade, but not thousands of different smiles or trees, distinctions that would not facilitate trade. Another bit of supporting evidence is that communities that share only a pidgin (simplified) language – imported workers, for instance – use it for trading and little else.

5. Decoration and Fashion

By increasing trade with strangers, language made it even easier to make a living, providing even more free time. How should the additional free time be used? As an engine of economic growth, trading has a major limitation: it can only increase the production and sophistication of goods and services considered valuable, worth trading for. It does not encourage the invention or development of anything that begins as something useless. Suppose Tool Y (new) is better than Tool X (old) but that the research required to make Tool Y requires more than a lifetime to do. No one would bother to do the necessary experimentation because there would be no market for the preliminary results, the early versions of Tool Y. The time would be better spent making things that people wanted.

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People needed to be paid for making and improving seemingly-useless things, things that might eventually lead to useful things. A kind of prehistoric grants program was needed. The necessary grants program in material science was provided in several ways. One was by the evolution of love of

decoration. Our aesthetic standards are appropriately low and high at the same time. It is not too hard to make something attractive. It is much easier to make something new and attractive than something new and useful. Yet there is always room for improvement. People began to spend their spare time making decorations, including cave art. As decorative skills and knowledge slowly grew, eventually some of it turned out to be “practical” – good for tool-making.

To increase diversity of research, another addition to our brains was whatever causes fashion – changing preferences for decoration. Fashion pushed artists to create, learn new tricks, because new tricks would fetch a higher price than old ones.

6. Music

Enjoyment of music provided a market for musical instruments. Thus it supported research on how to make better musical instruments. Like decoration, making a better musical instrument required advances in material science. As with decoration, our musical standards are low and high at the same time: Many things can be a drum, yet improvement is always possible. The materials and techniques required to make something sound better were surely quite different than those used

to make something look better, thus this grants program supported work quite different than did love of decoration.

7. Collections

Another bit of human nature that would have aided economic development is the urge to collect – form collections of such things as coins, erasers, man-made frogs, Disney pins, and so on. Collectors will pay more for this or that rare object than the rest of us. Thus they support artisans who are pushing the envelope

of their craft. Collections often consist of intricate, visually-similar items. Once a person has started his collection, gathered a few items of whatever he collects, two other aspects of human nature come into play. First, we enjoy seeing similar things side by side. Repetition is a very common decorative motif; we enjoy synchronized dance, synchronized swimming, parades (synchronized walking) and air shows (synchronized flying). This tendency pushes the collector to display the items in his collection side by side. Second, side-by-side comparisons create connoisseurs – persons who notice, and are willing to pay for, subtle differences.

Conclusions

A healthy economy is a diverse economy, as Jane Jacobs has said many times. It needs two sorts of diversity: a diversity of things for sale and a diversity of wants. The mechanism behind procrastination increases diversity on the supply side; the mechanisms behind decoration, fashion, music, and collections increase diversity on the demand side. The wonderful and diverse work of my students fits into my big picture of human evolution because, assuming the theory is correct, the high quality of the student work has a ready explanation: There is a powerful mechanism that pushes different students toward different jobs. It is another mechanism that, like the procrastination mechanism, creates supply-side diversity. Long before there was any sort of formal vocational training, young men and women figured out how to make a living. The picture I paint of Stone Age life, that it consisted of many different specialists, means that young Stone Age men and women, when choosing a specialization, went in many different directions. Not because they were told to (I don’t know of a single culture that promotes diversity of occupation) because they wanted to. Human nature is the same today. College students want to learn how to do something career-like, but what they want to learn varies greatly from student to student. My project assignments took

full advantage of this innate desire because they gave it free rein.

The big-picture theory I have outlined implies that what I observed – given the freedom to learn how and what they want to learn, students learn a great deal – is a basic feature of human nature. That is, it will usually be true. Skeptics would argue that my teaching experience was a special case. My students were not, of course, a random sample of all possible students. They were near the end of their education; in a few years most of them would be self-supporting adults. Perhaps they could

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handle the freedom I gave them better than younger students. My students had done well at formal education, much better than average. Maybe they were unusually good at self-management.

Anecdotes suggest that what I found is widely true. I told another professor in my department about my experience. “The more freedom you give students the better they do?” I asked. Yes, she said, that was her experience.

The Tomoe School, a primary school in Tokyo, illustrates another variety of student choice. It existed only from 1937 to 1945, when it burnt down. Its

founder, Sosaku Kobayashi, was heavily influenced by an earlier educator, Shunji Nakamura, who “advocated a sufficiently free curriculum to bring out the child’s individuality and promote self-respect.” At the beginning of the school day, the teacher would put a list on the blackboard of the subjects and questions to be covered that day. The students could work on them in any order they wanted. “Study was mostly independent, with pupils free to consult the teacher when necessary. The teacher would come to them, too, if they wanted, and thoroughly explain

any problem until it was thoroughly understood. Then pupils would be given further exercises to work at alone,” according to a 1981 memoir about the school (Tottochan by Tetsuko Kuroyanagi) that was a huge best-seller. The choices that a student made helped the teacher learn about him or her, and tailor the curriculum appropriately.

Formal education resembles agriculture. Agriculture greatly reduced the diversity of the human diet. Before agriculture, a person might have eaten 80 different foods in one week; after agriculture became the main source of food, the number was much less. Agriculture caused a big decline in health because its fundamental assumption – it is okay to eat a small number of foods – is wrong. We need diversity in our diets.

Likewise, the introduction of formal education, classrooms and textbooks and so on, must have greatly reduced the diversity of what was learned and how it was taught. If the fundamental assumption of formal education – different students should learn the same things in the same way – is likewise contrary to human nature, then it too must have had many unfortunate consequences. Given the boredom, anguish, and demoralization that school so often causes, that is all too plausible. As I read my students’ reports, I thought: This is health. And I realized I was seeing it for the first time.



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