LEARNING, EDUCATION, AND TECHNOLOGY IN DEEP HISTORICAL PERSPECTIVE

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ABSTRACT

In this meditation on children's learning from prehistoric times until today, Grove contrasts traditional child-rearing with child-rearing in our modern world. In the former, parents are not responsible for the rearing and learning of their children, who are cared for by an older sibling. Youngsters learn everything they need to know by observation and imitation of adults. How did humans get from that to modern education and technology? Grove imagines a prehistoric scene in which a child queries an aunt who had devised a way of record-keeping. She had begun to think using abstractions. If the child's going to learn that*, his aunt must instruct him. A scene like this was how our highly technological world, the product of abstract and symbolic thought, got its start. Too cerebral to be learned by observation and imitation, abstractions* must *be learned via instruction. Without instruction – schools – technologically advanced societies would not exist.*

KEYWORDS

Children's learning, Applied anthropology of education, Child-rearing practices, Ethnology, Cultural history

I offer the observations below as a meditation on the distance that we humans have traveled over thousands of years regarding the preparation of children for participation in our respective societies. Attendees at a conference such as EDUT 2025 represent the cutting edge of modern advances in children's socialization. This paper holds out an opportunity to pause and appreciate how far people like us have come, and what might have been lost as well as gained on our journey.

1. HOW CHILDREN ARE RAISED IN TRADITIONAL SOCIETIES

Anthropologists tell us that even during our 21st century, there are still indigenous and traditional societies, scarcely touched by modernity, in which children acquire all the survival skills, social norms, and factual information they need to become fully contributing members of their society, all with *no deliberate instruction*. One scholar has christened traditional children's gradual process of learning as "Learning by Observing and Pitching In," or LOPI. [1] It goes something like this:

Until a child is weaned, they are closely and constantly attended by their mother. But after weaning occurs – usually between ages 1 and 2 – neither she nor the father feel responsible for the day to day, hour by hour, raising of their child. They have adult concerns to tend to, many of which relate to the feeding of their family and others in their settlement. In only one way do parents in most traditional societies retain responsibility: they ensure that all their offspring internalize their society's code of manners and morals.

So, if traditional parents do not feel responsible for the day by day, hour by hour raising of their just-weaned child, who does? Usually, it's the next older sibling or cousin (girls preferred). Yes, the next older child might be only three years older, but that's how it often works. In the vast majority of cases, these are extended families whose members live in close proximity, sometimes under one roof. Aged grandparents typically take an active interest in their progeny, but they also are not responsible for the toddlers' hour by hour caretaking.

In many traditional societies, the just-weaned child and his or her slightly older sibling caretaker mingle with the other children of their settlement or camp. Typically, this is a mixed age, mixed sex band of energetic and curious little explorers who, free of adult supervision, have the run of the local area, including the nearby forest, fields, or mountain slopes. Now, if you're like many modern parents, you're aghast at this arrangement, sensing vast scope for danger and mischief.

But that's not what anthropologists tell us. Instead, they say, traditional children devote some of their time to watching adults and older children to figure out how they do whatever they're doing. They observe and, privately and in small groups, imitate in trial-and-error fashion; they keep at it until they begin getting it right. (If you're thinking "experiential learning," you wouldn't be wrong.) At that point, they begin trying to pitch in with the adults' activities. LOPI. Their initial attempts are pretty bumbling, of course, but adults welcome their efforts. Why? Because the contributions of *every* able-bodied settlement member are needed to ensure the group's survival.

For us to accurately imagine the lives of traditional families, we need to recall that it vastly contrasts with ours in two ways. Their physical environment might be a dense forest, a rocky desert, or a barren mountainside from which families must coax their daily sustenance despite the vagaries of nature. And their familial relationships are animated by values unlike the individualism that infuses our modern lives. Each of us (if raised in the U.S. or other Western society) centers our experiences around our individual "self," which has unique needs, qualities, and capabilities. We appreciate our families, but their main role is to support our autonomy. Traditional people's lives are inspired by the values of *communitarianism*, [2] which centers their identity and experiences around their extended family. One's "self" is one's family. Each member internalizes the family's aspirations and needs so that the extended family's well-being and reputation is each member's highest priority. The guiding principle is "What I want is *what we need*."

That's a highly generalized account of how, in traditional societies, children learn everything they need to know. There are variations in this pattern that we'll skip for now. My goal isn't to tell you about traditional child-rearing, but to note that, apart from internalizing the moral code, *instruction by parents and teachers plays no role in the process*. Yet children become, at astonishingly early ages, contributing members of their societies who willingly take on responsibilities that modern parents never even dream of giving a child. All without schools or technology. [3]

So how did modern humans get from there to education and technology?

2. How LOPI Learning Became Supplemented by Something New

Before beginning to answer the question about the advent of education and technology, I'd like to review the meanings of those two words.

***Education*:** As applied to growing children, this word's proper meaning is similar to that of *socialization*. It refers to children's internalizing and applying in daily life the values, behavior, and relationship patterns of their community's culture, which gradually ready them for adulthood. In all societies including ours, LOPI – Learning by Observing and Pitching In – is one of the means by which children become educated/socialized. In recent decades, however, "education" has begun referring to what goes on in schools. However, the proper term for formal learning events is *instruction*, which has a far narrower meaning. In some traditional societies, instruction does play a limited role in growing children's education/socialization. For example, during coming-of-age initiations, which typically are brief, elders instruct children about key aspects of their community's norms of behavior.

***Technology*:** This word refers to the application of knowledge to the practical goals of human living, i.e., to the physical or mental (symbolic) manipulation of the environment. This all-inclusive definition applies equally to a stone ax and a nuclear reactor. So, for this article, I will distinguish between a practical activity that one can learn via LOPI, and a technology too complex

to be readily mastered by observation. You know how to use a hammer; did an older person sit you down for planned instruction? How about algebra?

Let's return now to imagining a time, long long ago, when growing children learned everything they needed to know as adults simply by watching others. Such times are thought to have prevailed for every human and every society on Earth for hundreds of thousands of years, until roughly 10,000 years ago.

But there came a fateful day when an ancient hunter-gatherer, nomad, or mountain herder had an idea about an improved way to get things done. Let's imagine that the weather had been favorable and edible plants were abundant. This society had started to store plant material for lean years. Someone had the bright idea that it would be useful to keep records of what had been stored: how much, when, and so on. Her unique idea was *how to keep such records*.

OK, that's a story I created out of whole cloth. My point is this: Someone came up with an innovative method of getting work done that could benefit her entire group, *if* at least a few other group members learned how to use it. But her skill or idea was totally beyond the experience of any other group member. It was far too conceptual and complex for anyone to master simply by watching, imitating, and pitching-in.

Imagine now that *you are there*, thousands of years ago, at the granary with your aunt. You see her deliberately making weird dents in soft clay tablets, [4] which in your experience is utterly strange. She responds to your query by saying she's keeping records. If you're going to learn to do *that*, she will need to instruct you.

"She will need to instruct you" indicates that your aunt will need to set aside time for the specific purpose of intentionally helping you master her technique. For this largely cerebral learning task, LOPI isn't good enough. Instruction will need to occur.

In all societies, from prehistoric through 21st century modern, youngsters rely on observation, imitation, and participation to learn not only normative behavior but also constructive activities such as tilling the soil, erecting a hut, weaving a basket, sewing a dress, baking a birthday cake, or using a push lawn mower. At some point, what we now call apprenticeships came into use in cases where the constructive activity required more skillful precision, such as building boats and fashioning fine ceramics. Early apprenticeships relied on LOPI enhanced by the master's occasional guidance; planned, deliberate instruction played little or no role.

Notice that tilling the soil and the other five examples I used above have in common that performing them competently does not *require* the use of letters (or characters), numbers, or other abstract symbols. I put "require" in italics because in today's world, we expect to learn manual, culinary, and artistic skills largely if not entirely by means of printed or online manuals and recipes, or through formal instruction. But these are not essential. Across millennia, people mastered multiple types of knowledge and skill without using written materials and without formal classroom instruction. They watched, imitated, practiced, and learned: LOPI.

But at some point in time, those ways of learning became insufficient.

3. How Learning, Education, and Technology Became Intertwined

Let's return to my imagined story about the granary woman. Her normal mental process had been to rely solely on thoughts about tangible things and their practical relationships. Somehow, she added the ability to think in terms of qualities, categories, and symbols. In other words, she also began to think about things using abstract concepts, to manipulate those concepts mentally, and to keep track of her manipulations using arbitrary marks – symbols. This mental technology is almost impossible to learn by merely watching, imitating, and practicing, even over long periods of time, because it involves intangible abstractions harbored in someone's mind and seemingly meaningless squiggles on a surface (clay, slate, paper, computer screen, etc.).

The story above imagines the first step of a millennia-long process by which technologically advancing societies separated from traditional ones. That step also began the equally long process of making learning via instruction increasingly indispensable for youth in modernizing societies. As the necessity of instruction grew, schools began to appear. As the complexity of subjects and the number of learners increased, instructors sought ways to facilitate their teaching. They turned to technologies – educational technologies – beginning with pieces of slate and bits of chalk.

Planned, deliberate instruction and modern society are inextricably linked. What links them is the impossibility of mastering, using only LOPI methods, the symbolic foundation and physical complexity of the skills and knowledge that drive modern life. Technologically advanced societies could not have come into existence in the absence of formal instruction.

4. KNOWLEDGE AND LEARNING IN TRADITIONAL AND MODERN SOCIETIES

I'd like to close with two reflections on the perspectives I've shared above.

First, the fact that children in traditional societies learn on their own, with no adult instruction, is greatly admired by some modern folks, who advocate that educators rethink schools so pupils may learn what they like, when they like, and how they like. This works if the skill is to herd llamas, grind corn, or care for your just-weaned sibling, thereby doing as your elders do and visibly contributing to your family's well-being. But suppose the skill is to multiply fractions, use gerunds, or distinguish endothermic and exothermic chemical reactions. A modern child rarely observes adults doing such things, none of which has any visible effect on her family's well-being. Schools came into being precisely because skills and knowledge were appearing that were virtually impossible to learn via LOPI. To expect children to learn symbolic technologies how and when they like would sabotage their preparation for participation in our modern societies.

Second, we modern folks thank our lucky stars that our ancestors were on the modern side of that millennia-long split. For we are the beneficiaries of myriad advantages that symbolic thinking and its spin-off technologies have bequeathed to us: better nutrition and health, increased geographic mobility, rapid communication over distances, and comforts, conveniences, and entertainments previously unimaginable. It's tempting to view those on the other side of this split as inferior to us mentally. Until a few decades ago, indigenous and traditional societies were commonly labeled as "primitive," i.e., backward and impaired. But for an alternative view, consider these excerpts from the penetrating 2015 book by Yuval Noah Harari, *Sapiens: A Brief History of Humankind*:

> Scholars once proclaimed that the Agricultural Revolution was a great leap forward for humanity. They told a tale of progress fueled by human brain power. Evolution produced ever more intelligent people who cheerfully abandoned the grueling, dangerous, and often spartan life of hunter-gatherers.
>
> That tale is a fantasy. There is no evidence that people became more intelligent with time. Ancient hunter-gatherers' survival depended on the intimate knowledge of the animals they hunted and the plants they gathered. They also mastered the internal world of their own bodies and senses. They listened to the slightest movement in the grass to learn whether a snake might be lurking there. They carefully observed the foliage of trees to discover fruits, beehives, and bird nests. They moved with a minimum of effort and noise, and knew how to sit, walk, and run in the most agile and efficient manner. Varied and constant use of their bodies made them as fit as marathon runners. They had physical dexterity that people today are unable to achieve even after years of practicing yoga or t'ai chi.
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> There is some evidence that *the size of the average Sapiens brain has actually decreased* since the age of hunter-gatherers. Survival in that era required superb mental abilities from everyone. At the individual level, they were the most knowledgeable and skillful people in history. [5]

During May 2023, many of us were riveted by the story of four children, ages 13, 9, 5, and 11 months, who survived the crash of a small plane in the Amazon forest and had to rely on their wits – their accumulated knowledge, skills, and experience-honed instincts – to remain alive. They were members of a nearby indigenous society, the Huitoto. Emaciated but alive, they were found after 40

days. The oldest child, Lesly, had cared for the others, just as she'd done when they were at home. Forty days in the jungle. Could any young children of your acquaintance have done that? [6]

None of the superb mental abilities that enabled those four youngsters to survive were learned in a classroom, nor at the knee of any instructor. No technology helped them gain detailed familiarity with the infinite jungle; they learned all *that* because they were comfortable in the forest and had become accustomed to its ways via learning by observing and pitching in. LOPI.

Thanks to our ancient forebears and the technologies they gradually developed, our modern lives are awash in conveniences and possibilities. But maybe something useful was lost in the process.

References

[1] See the research of Barbara Rogoff and her collaborators. Dr. Rogoff is professor of psychology at the University of California, Santa Cruz. Visit people.ucsc.edu/~brogoff. See also David F. Lancy (2024), *Learning Without Lessons: Pedagogy in Indigenous Communities*, Oxford. Dr. Lancy is Emeritus Professor of Anthropology at Utah State University. Visit davidlancy.org.

[2] By "communitarianism," I refer to the same value-set that has long been termed both "collectivism" and "group-orientation." I much prefer the term communitarianism because it is derived from the word "community."

[3] An excellent example is Inge Bolin (2006), *Growing Up in a Culture of Respect: Child Rearing in Highland Peru*, University of Texas Press.

[4] I am referring to cuneiform writing, consisting of wedge-shaped impressions in soft clay. The Wikipedia entry for cuneiform includes many clear, close-up photographs of cuneiform tablets.

[5] Yuval Noah Harari (2015), *Sapiens: A Brief History of Humankind*, Harper, excerpts from pages 49, 78–79, and 121, lightly edited; italics added. Harari's contention that the size of the average Sapiens brain has decreased is supported by his endnote 5 on page 418, which cites scientific articles in the journals *Nature*, *American Journal of Human Biology*, and *Human Nature*, and the 2005 book *Modern Morphometrics in Physical Anthropology*.

[6] Among the available news reports, see pbs.org/newshour/world/4-indigenous-children-found-alive-40-days-after-plane-crash-in-amazon-rainforest. Also insightful is the National Geographic documentary film, 'Lost in the Jungle': films.nationalgeographic.com/lost-in-the-jungle. The saga of the four children is more complex than I explain in the text. News reports described their society, the Huitoto, as "indigenous" but left out the fact that it was well into the process of modernization. One way we know it was modernizing is because when the children finally got to a hospital, what did they ask for? Books! I believe that if their society had been pre-modern, i.e., much more similar to that of hunter-gatherers, the four would have survived their 40 days in the Amazon jungle in significantly better condition.

Author

Cornelius N. Grove is an independent ethnologist of education. He holds an M.A.T. degree from Johns Hopkins University and an Ed.D. from Columbia University. He has taught high school history, worked as an editor in educational publishing, served as director of research for AFS International, and held adjunct teaching posts at Columbia University, New School University, and Beijing Foreign Studies University. In 1990, Dr. Grove founded GROVEWELL LLC and, with a partner, built it into a global leadership consultancy serving major corporations. GROVEWELL closed in 2020. Dr. Grove is co-author of *Encountering the Chinese* (Hachette) and author of *The Aptitude Myth*, *The Drive to Learn*, *A Mirror for Americans*, and *How Other Children Learn* (Rowman & Littlefield). He currently is completing *Misaligned Minds* (Bloomsbury). This paper is based on his research for *How Other Children Learn*; visit howotherchildrenlearn.info. Dr. Grove and his wife live in New York, USA, and have three adult sons.