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The Growth and Limits of Recipe Knowledge

Leigh S. Shaffer
West Chester State College

This essay describes a form of thinking about the world that I have called "recipe knowledge," (following the usage of Berger and Luckmann, 1966). The article elucidates the concept of recipe knowledge, traces the growth of its impact on United States culture, and states the limits of recipe knowledge. The thesis is that people have come to confuse recipe knowledge with the traditional knowledge of the sciences and the humanities, and that a clear distinction between these two forms is necessary to explain and resolve many contemporary problems in society including "anti-intellectualism".

Scholars from many disciplines are busy today attempting to uncover and assess the impact of technology on the thought processes of members of modern, industrialized societies. In this essay, I wish to describe a form of thinking about the world that I will call *recipe knowledge,* which I believe to be an implicit effect of the spread of technology on contemporary culture. My thesis is that citizens of the modern world have come to confuse recipe knowledge with the traditional knowledge of the sciences and the humanities, and that a clear distinction between recipe knowledge and traditional knowledge is necessary both to explain and to resolve many educational problems in society. I will first elucidate the concept "recipe knowledge", then trace the growth of its impact on American culture, and finally state the limits of recipe knowledge for the purpose of clarifying the character of the future of "recipe thinking". When I am done, I will hope to have shown that "anti-intellectualism"—often expressed by public reformers of higher education as a demand for "relevance"—may be understood as an extention of recipe knowledge, and that an understanding of the limits of recipe knowledge will suggest ways in which institutionalized education may reassert the value of traditional knowledge.

The Concept of Recipe Knowledge

I have borrowed the term "recipe knowledge" from Peter Berger and Thomas Luckmann's influential book *The Social Construction of Reality*

Requests for reprints should be sent to Leigh S. Shaffer, Ph.D, Department of Psychology, West Chester State College, West Chester, Pennsylvania 19380.

(1966). In the context of analyzing the process of socializaton for events of daily life, Berger and Luckmann describe the mind-set of the person socialized as follows:

> Since everyday life is dominated by the pragmatic motive, recipe knowledge, that is, knowledge limited to pragmatic competence in routine performance, occupies a prominent place in the social stock of knowledge. For example, I use the telephone every day for specific pragmatic purposes of my own. I know how to do this. I also know what to do if my telephone fails to function—which does not mean that I know how to repair it, but that I know whom to call on for assistance.... All of this telephonic lore is recipe knowledge since it does not concern anything expect what I have to know for my present and possible future pragmatic purposes. I am not interested in *why* the telephone works this way, in the enormous body of scientific and engineering knowledge that makes it possible to construct telephones. Nor am I interested in uses of the telephone that lie outside my purposes, say in combination with short-wave radio for the purpose of marine communication. Similarly, I have recipe knowledge of the workings of human relationships. (p. 42)

They summarize the major themes of their analysis as follows: "A large part of the social stock of knowledge consists of recipes for the mastery of routine problems. Typically I have little interest in going beyond this pragmatically necessary knowledge as long as the problems can indeed be mastered thereby" (p. 43). To expand what is implicit in Berger and Luckmann's illustration, "recipe knowledge" is a blending of metaphors from the shop and the kitchen which describe routine forms of knowledge common to industrial society. Technology has made it possible to manufacture products which separate the knowledge needed to *use* the product from the knowledge of the workings of the produce involved in its manufacture. The explicit role of a human factors engineer is to design a product (like a telphone) so that the user of the product does not have to understand scientific and technological principles (like electricity, conductivity, transducers, relays, or switching mechanisms) in order to use the product. Stated in a more dramatic way, recipe knowledge is possible precisely because the engineer has designed the product to allow the user to *remain ignorant* of the essential workings of the product. The user is asked merely to master a few simple lessons in the product's intended use, and since the lessons often involve learning a sequence of simple steps to obtain the end result, the knowledge of the product often take the form of a recipe.

The epitome of this process is the "black box." In harder technology it has been possible to reduce the level of technical training necessary for repairing a product by manufacturing self-contained systems which perform a complex function—a "starter" on an automobile is a good example. A mechanic is not required to understand the principles of design for the ignition system either to diagnose or correct malfunctions, but simply removes a "starter" and replaces it with another one. Technicians refer to units like starters as black boxes to emphasize that the mechanic need not

understand the unit's *internal workings.* Indeed, by replacing a whole system the mechanic never discovers precisely what has malfunctioned, and nearly always replaces some components that are still functioning properly. But whether one speaks of following explicit steps to achieve a desired end (that is, to follow a recipe), or speaks of replacing a mysterious unit with another unit of the same type (that is, to install a "black box"), one speaks of a modern form of knowledge which confers "pragmatic competence" in the use of products without conferring understanding of the product itself. The subject of my essay is this modern form of knowledge, and I will refer to it in this easay with Berger and Luckmanns' term "recipe knowledge."

There are four characteristics that distinguish traditional forms of knowledge from recipe knowledge. First, traditional knowledge aims to confer understanding in its students; recipe knowledge confers no understanding, but is merely memorized. Whether in the sciences or the humanities, traditional knowledge involves developing a clear and systematic epistemology within a field of study. Traditional knowledge includes such understandings as apprehending or grasping the nature of an object, comprehending the explanation of a phenomenon, or appreciating the value of a work of art. The students' acquaintance with "facts" in a discipline is accomplished in service of the higher goal of such understanding. But recipe knowledge confers no understanding; the product of technology is a mysterious black box. It is impossible to infer the workings of a black box from recipe knowledge of its use; the best attempts at such inferences are fanciful endeavors that range from the comic to the tragic. For example, from knowledge of input and output of computers most people have come to understand computers as thinking machines, but their popular notions of cybernetics seldom mirror the rudiments of programming or the mathematical character of "computers" (despite the obvious etymology of the term). From recipe knowledge of symptoms and treatments have come a plethora of "centers" (cough centers, pain centers and the like) which make for laughable television commericals. But recipe knowledge of symptoms and treatments have also led to tragic reasoning: "If two pills will make me feel better, four pills will make me feel twice as good!" When a person says "I understand" a statement of recipe knowledge, the person can only mean that the statement is intelligible and not garbled. That person cannot mean that he or she is in any way illumined about the workings of a product, but that he or she is merely informed about its use. The efficacy of recipe knowledge is limited to those steps which are memorized and carried out, although those who do not have a clear grasp of this limitation of recipe knowledge may be fooled into believing that they know more than they really do.

Second, traditional knowledge is limited in the sense that it recognizes that its best propositions are only approximations to truth; recipe knowledge is *certain.* Popular epistemology has never given up the ideal of certain knowledge, and recipe knowledge is the modern champion of that ideal. Whereas traditional knowledge inevitably involves qualification, statements of limits of applicability, *ceteris paribus* clauses and caveats, recipe knowledge works for all people, all places and all times at one hundrd per cent accuracy. The only circumstance in which recipe knowledge fails this expectation occurs with product breakdown, but in that circumstance it is the users' perception that it is the product, not their recipe knowledge, that has failed them.

Third, traditional knowledge is *transcendental,* while recipe knowledge is *experiential.* Both the sciences and the humanities are transcendental (transcending experience but not human knowledge) because they have both gained their insights by going beyond the world of experience. Art transcends mundane reality to find truth in the realm of the fanciful. Science transcends even acute common observation to "see" into the world's grain (through a microscope), beyond its horizons (through a telescope), backward into its past (through archaeology and geology) and forward into its future (through mathematical extrapolation). Neither art nor science is limited to, or fully tested in, human experience. But recipe knowledge is fully experiential, it is fully testable in mundane reality because it is designed for mundane reality. When people appeal to their experience for validation of "facts," they feel immediately at home and comfortable with recipe knowledge in a way that they never can with traditional knowledge.

Fourth, traditional knowledge is *personal* while recipe knowledge is *impersonal.* It is impossible to understand science or the arts without being aware of the major contributors and schools of thought and expression that have shaped their history. The story of the humanities and the sciences is a study of human cultural achievement and is, therefore, intrinsically concerned with persons. However, recipe knowledge is impersonal; no names are associated with such knowledge. In the example of the telephone, the only name that the average person can associate with the product is Bell. The countless engineers whose work is displayed in the modern telephone are unknown to the telephone users. The form of recipe knowledge is anonymously designed to meet the needs of the user rather than the engineer; for example, telephone numbers are not longer than seven digits because of the limits of the user's working memory—not because of an inherent limit in the engineering design. The history of the development of the telephone is irrelevant to the character and use of "telephonic lore." There are no competing "experts" or schools of thought about recipe knowledge, because the exigencies of

the marketplace dicatate that recipe knowledge must be unitary. Therefore, while traditional knowledge is intrinsically personal, recipe knowledge is characteristically impersonal.

The Growth of Recipe Knowledge

Berger and Luckmann also allude to several issues that form the basis of my concern with recipe knowledge. First, they link recipe knowledge with what they call the "pragmatic motive" of everyday life. As they describe it, the pragmatic motive involves being disinterested in going beyond "pragmatically necessary knowledge" to solve the routine problems of daily life. In the passage that I have quoted, the limitations imposed by the pragmatic motive are dramatic. The scope of recipe knowledge is "what I have to know for my present and perhaps future pragmatic purposes." The extent of a person's interest in a product or subject is narrowly circumscribed: "I am not interested in why the telephone works this way...(n)or am I interested in uses of the telephone that lie outside my purposes...typically I have little interest in going beyond this pragmatically necessary knowledge as long as the problems can indeed be mastered thereby."

As a college student of the sixties, I recognize in these statements the rhetoric of "relevance" that I heard during that troubled period. I believe now that the demand for relevance in college courses was, at least in part, a demand arising from the confusion of traditonal and recipe knowledge. Sociologically, the sixties involved a swing toward vocationalism among college students who were looking for curricula that formed clearly-defined channels for recruitment into jobs commensurate with their aspirations for upward mobility. But it was also a time when students had finally grown more accustomed to recipe knowledge than to traditional knowledge and began, wrongly I believe, to feel that it was realistic to expect recipe knowledge in their courses. And I believe that much of the malaise reported in college students of the seventies is better understood as symptoms of a consumer orientation to knowledge that stems from the pragmatic motive rather than simple vocationalism.

When education began to accept the pragmatic motive as a justification for curricular reform, this acceptance unwittingly paved the way for a new wave of anti-intellectualism. Whenever one tries to define "intellectuality", the definition invariably involves transcending mundane reality; an "intellectual" in some sense steps outside of daily life to study non-routine problems, and evaluates the world of culture or expression in terms of some superordinate values. From this point of view, a person who holds to the pragmatic motive and demands that education conform to relevance is profoundly anti-intellectual. In the past, intellectual

growth has involved stretching both students' abilities and interests as they learned about traditional disciplines. Recently, the consumer demand has been for college courses molded in the students' images, and the demand for recipe knowledge has, therefore, created incipient anti-intellectualism within higher education. Rene Dubos (1970) has recently argued that the knowledge explosion of the twentieth century has been accompanied not only by professionalism but parochialism; specialization of expertise was necessary because of the volume of knowledge, but Dubos argues that specialization of *interest* was not. Thinkers like Dryden, Bronowski and C. P. Snow, whose careers transcended the distinction between literature and the sciences are rare – as much for lack of breadth in interest as for lack of expertise. Snow's influential "two cultures" hypothesis (Snow, 1963) is a case study of specialization of interest, and I believe that anti-intellectualism among the highly educated is simply an extension of the pragmatic motive into highly-specialized, but routinized professions.

The symptoms of recipe thinking in the classroom are plain to see. Students often demand impersonal knowledge, showing little patience for learning about schools of thought or the theories of major thinkers. This attitude is often manifest in the bored question, "Do we have to know the names in the book?" Students implicitly demand certain knowledge, showing little interest in (or retention for) qualifications of generalizations or statements of probability or trend. This disenchantment with limited knowledge is even manifest in a piece of recipe knowledge that appears in student self-help manuals dealing with testmanship: "On objective tests, answers that use words 'always' or 'never' are *always* wrong!" Students also demand to know what information is important enough to "know for the exam" and conceive of studying as memorizing the important material; understanding the material is often seen as a nice side-benefit of a course, but is not considered an essential feature of a course. Finally, students demand relevance in their courses, and relevance is almost always defined in experiential terms: "I want something practical," "I'll never need to know that again," "I'm never going to Germany, why do I have to know German?" If traditional knowledge is transcendental, relatively little of it will pass the experiential standard of relevance.

The pragmatic motive is not limited to educational institutions either. Senator William Proxmire's well-publicized Golden Fleece awards are visible testimony to recipe thinking in government. One of the Senator's most famous awards was given to two social psychologists whose proposals to the National Science Foundation for basic research on "love" were awarded the Golden Fleece (for a description of the episode see Shaffer 1977). One press release concerned with the federal version of the

"Love Machine", manifested its objections in terms of recipe thinking:

> But the biggest waste has to be $84,000 to find out why or how or if or how long people fall in love. I object to this because no one—not even the National Science Foundation—*can argue that falling in love is a science*; not only because I'm sure that even if they spend $84 million or $84 billion *they wouldn't get an answer that anyone would believe.* I'm against it because I don't want the answer. (Shaffer, 1977, p. 816; emphasis added)

Simply stated, when Proxmire asserted that no one could make a science of falling in love, he was asserting that he could not envision anyone finding recipe knowledge of a process like falling in love. His argument may be paraphrased as follows: The so-called "love research" was a waste of money because no researcher could ever discover a set of steps—"one, two, three you're in love"—that would transform loving into a "science." Only a fool could believe such a claim; therefore, the love research was a boondoggle. It is clear that Senator Proxmire's stated objections to this research follow from an identification of recipe knowledge with the type of knowledge attainable by social-psychological research. None of the researchers did (or would) claim that such a recipe was the aim of the proposed research. But most scientists would not agree that research into complex social processes produces no knowledge whatsoever. I must vigously disagree with the implication that these studies can produce no knowledge, and my disagreement is fundamentally an epistemological disagreement—a response to the Senator's confusion of scientific knowledge with recipe knowledge. Perhaps the bitterest irony in Senator Proxmire's statement is his colloquial phrase "make a science of", which makes the word *science* stand for recipe knowledge (Shaffer, Note 1).

I do not want to give the impression that the growth of recipe thinking is unprecedented. In the United States the growth of the pragmatic motive and the spread of technology were facilitated by the presence of colonial values and were already deeply ingrained in the New World culture. Richard Hofstadter (1963) has argued that the survival motive of the American pioneer and the profiteering motive of the growing business community served as vehicles for an ideology that he characterized as the "cult of practicality" in which the ultimate standard for evaluating any new idea or practice became sheer utility. One evidence of this focus on practicality was the emergence around the turn of the century, of "self-help" literature which offered "how to succeed" advice in every area of business, politics, and social endeavor. In this literature, a strict distinction was made between "practical knowledge", which was inevitably said to be learned by experience, and "theoretical knowledge" that was associated with "book-learning".

Of special relevance to the spread of recipe thinking was the wedding of the cult of practicality with the belief in the teaching value of ex-

perience. Daniel Boorstin (1968) has argued that the form of empirical knowledge most familiar to the colonist was not science but natural history. Natural history was an easy extension of experience, was practical (particularly for the ethnobotany it contained), and was easily read by anyone with familiarity of the countryside. In contrast, scientific writing did not limit itself to the world of experience for its evidence, nor did it limit itself to the practical concerns of daily life. Science books seemed mysterious to the colonial mind because they often contained reference to experiments conducted in contrived, rather than natural circumstance, and observations taken from exotic or out-of-the-way places that could not be confirmed in the colonists' experience. That is, the natural history of Audubon had the same appeal to early Americans that recipe knowledge does now: utility in the world of immediate experience. But the topics and evidence treated in science books, even in colonial times, was transcendental and therefore of little interest to those readers whose sole concerns were limited to mundane reality. As technology progressed, people dominated by the desire for practicality could contrast the "esoteric" and "impractical" scientist with the natural historian and a new breed, the inventor. Inventors like Bell or Whitney came to be appreciated and remembered in the United States in a way that scientists never were, both because the introduction of inventions rapidly elevated the American standard of living and because the growth of technology appealed to Americans who valued practicality in the same way that natural history had appealed to previous generations. Thus the American value of practicality, confirmed in the American mind by the successes of the natural historian and the inventor, paved the way for Americans to receive the recipe knowledge that represented to them the payoff of progress—even in the sciences.

The spreading of the fruits of technological progress brought recipe knowledge into the lives of most people, and the "practical" side of education swiftly grew to involve teaching recipe knowledge of the newest products of technology. My concern is that the presence of recipe knowledge subtly began to transform the conceptions of traditional knowledge until the confusion of traditional knowledge and recipe knowledge reached even higher education. Courses labeled as "applied" began to proliferate, and departments sometimes committed the curricular non-sequitur of allowing students to enroll in applied courses without having taken the prerequisite "theory" course. At larger institutions that could afford duplication of curriculum, many prospective teachers began taking narrowly defined professional courses instead of the usual substance courses of an academic discipline—"Math for Secondary Education Teachers", in place of "Analytic Geometry and Calculus." Whole subjects began to be converted to recipe knowledge.

Except for the courses designed for its majors, mathematics departments were widely expected to offer recipe knowledge for non-mathematicians (at my alma mater they were even called "cookbook courses"). In this scheme, mathematics became a black box; it was deemed as unnecessary to learn theorems, derivations and formulae as it is to learn to make radios. Since a mathematical formula does, of course, prescribe a definite series of operations to arrive at a desired figure, it has the form of a recipe. However, understanding a mathematically defined concept has traditionally involved learning a formula (which ultimately defines the concept), the derivation of that formula (to learn why the designated variables determine the numerical value of the concept), and any assumptions that were made in the derivation. Recipe thinking transformed these concerns as follows: the derivation of a formula (and the assumptions made in the derivation) is irrelevant to practical mathematicians. It is only necessary to know that they want to calculate a certain product (like a correlation coefficient), and a consultant (that is, an expert) can tell them what product to calculate. Then it is a practical necessity to understand a formula only to the extent that it is possible to accurately follow the prescribed steps in the proper sequence. And the most practical mathematics book (that is, a "cookbook") will actually state the step *in words* so that reading a formula is not absolutely necessary. The result of such "practical" mathematics is that students become completely dependent upon an expert not only to tell them what to calculate, but often *how* to make the calculations – perhaps even to the extent of what buttons to push on a pocket calculator. Not coincidentally, the number of mathematics majors in higher education today is less than one-fourth of what it was in the middle sixties (Walsh, 1979).

The Limits of Recipe Knowledge

I do not believe, however, that recipe thinking can continue to spread indefinitely. Berger and Luckmann explicitly acknowledge the personal limits imposed upon the consumer by recipe knowledge. When the circumstances become non-routine – or, in plain language, when the product breaks or malfunctions – the consumer must call upon an expert to repair it. This solution sounds plain and acceptable enough for everyday technology. But what do people do if their bodies malfunction, their marriages fall on hard times, or their skills in childrearing fail to meet their needs? In a society that is dominated by recipe thinking the answer must inevitably be "call in an expert," However, for the United States in general, and for its system of higher education in particular, this answer does not fully suffice because at some level, most people recognize that dependence on expertise in every important facet of life leads to a subtle,

but unacceptable form of authoritarianism.

There is a dilemma inherent in the acceptance of recipe thinking because people in the United States have a well-documented distrust and dislike of experts! By demanding to know only what is relevant (that is, recipe knowledge), and by being willing to remain ignorant of the traditional knowledge upon which the recipes are based, a person becomes increasingly dependent on outside expertise in virtually every aspect of life. The anthropologist Francis L. K. Hsu (1972) has argued that the core value of the culture of the United States is self-reliance, and that Americans have an almost pathological fear of dependence. In line with Hsu's analysis, public opinion polls and surveys indicate that there is widespread antipathy for physicians, scientists, large-scale technology, and indeed, for expertise of almost any kind. There has even been some recent backlash at consumer-advocate groups because, in part, they too speak from expertise, albeit on behalf of the consumer. From the time of Roosevelt's "brain trust" to the present, public resentment of experts has been plain. But the irony of the current situation is that the demand for relevance, in the form of rebellion against traditional knowledge and its purveyors, has led the populace with its recipe knowledge to become more dependent than ever on the keepers of traditional knowledge who are now called "the experts"—the people who must be called in to fix things that go wrong and to design the society of the future. I wish to argue that much of the tension that has so often been detected between the general populace and the research and academic communities comes from the public's unwitting dependence on the intellectuals it has never fully embraced. The desires for self-reliance and for pragmatic competence are an ox and an ass yoked together.

In addition to the personal limits imposed upon the "consumer" by recipe thinking, there is, I believe, an absolute limitation to the growth of recipe knowledge: there can be no recipe knowledge of anything that has not been designed by a human being. Recipe knowledge of technology is possible because of the role of human factors engineers. As I stated above recipe knowledge is possible because engineers, who *do* understand science and engineering have *designed* their products to allow the consumer to successfully use them and yet remain ignorant of what the engineers know. But I know of no legitimate theology or metatheory of the evoluation of the cosmos that teaches that God or Chance created the world to be manipulable in the same way. The possibility of recipe knowledge of the world in whole or in part vanishes in the absence of a Human Factors Engineer! When Berger and Luckmann (1966) speak of having a recipe knowledge of people, they mean only that the *form* of social knowledge has a recipe-like character. As has been noted, folk wisdom is often conveyed as aphorisms given without qualification. But

intelligent people become aware of the practical limitations of such platitudes in extenuating, "real-life" circumstances and modify the course of their behavior accordingly. What I am denying here is that there can ever be any certain, impersonal, experientially validated propositions about human beings (or the physical world) which, when memorized and applied, will allow a person to manipulate human beings or the environment. The quest for pragmatic competence in the world is inherently limited, and, humanly speaking, the traditional wisdom of the sciences and the humanities is irreplaceable.

If I may state my beliefs in the language of existentialism, the growth of recipe knowledge represents a profound loss of nerve, a symptom of inauthentic living. The truth of the matter, in Erich Fromm's (1941) well-known phrase, is that no one can truly "escape from freedom." Just as Fromm's historical analysis indicated that the escape from freedom always involves a retreat to authoritarianiam (Fromm, 1941), I have argued that the spread of the pragmatic motive has led to a form of authoritarianism—dependence on experts. If I am correct, then attempts to reverse this trend will be met with resistance, because the anti-intellectualism that flows from the pragmatic motive is driven by psychological defense mechanisms! That is, persons who reject traditional knowledge on the grounds of irrelevance are threatened people. They may be threatened by the level of intellectual accomplishment demanded by formal schooling or they may be among those who feel alienated by the current trends of our culture—there may indeed be reasons to be threatened by contemporary culture. But if people have adopted the rhetoric of relevance as a justification for walling themselves off from everything but mundane reality, then they have made commitments that will generate anxiety and resistance if traditional knowledge is offered when recipe knowledge is demanded. Many clinical psychologists, when trying to piece together the best course of action for a person in distress, have been told, "Just tell me what to do!"

Let me state the implications of this line of reasoning for the field of psychology. As I have argued more fully elsewhere (Shaffer, Note 1), the public's expectation of psychology is that psychologists should be able to provide recipe knowledge of human behavior! People expect that psychologists should be able to give "practical advise" allowing them to manipulate themselves ("How to stop smoking") and others ("How to win friends and influence people"). Their expectation is that this advice should "work" (that is, be *certain*, like recipes for using technological products), be "understandable", or stated another way, be subject to authoritative approval by an agency like the FDA (that is, be explainable and testable in the world of experience). And they usually show little patience with "schools of thought" (that is, they expect the knowledge to be

impersonal because it is "factual"). Public understanding of psychology is therefore low, because even students in the college classroom tend to maintain these expectations, and other social authorities in the culture (such as advice columns, self-help literature, and self-improvement courses) claim to meet (and therefore legitimate) these expectations.

My contention here is that psychology can never meet these expectations, because there can never be recipe knowledge of human behavior. Psychological knowledge must have the form of traditional knowledge. My concern is that, without a clear understanding of the character and limits of traditional knowledge and recipe knowledge, legitimate psychological research and findings will be improperly rejected by a large segment of the public. This kind of rejection has been clearly evident in the Golden Fleece phenomenon (Shaffer, 1977; Shaffer, Note 1), and represents no idle threat to professional psychologists.

Higher education must lead the battle to uphold the value of knowledge in the sciences and the humanities. Students and professors must be clear in understanding the limits of recipe knowledge. Within the limits of time and energy, students and professors alike must eschew pragmatic motivations toward education; it may not be possible to actively pursue interests in all areas outside of one's major or area of specialty, but it is possible to affirm the value of other disciplines and to tune in, rather than automatically tune out, information about other disciplines. Professors must work toward providing experiences and assignments that develop understanding, and avoid as much as possible encouraging students toward mere memorization of course material. As Jacques Barzun wrote in *Teacher in America*, "(T)he whole aim of good teaching is to turn the young learner, by nature a little copycat, into an independent, self-propelling creature, who cannot merely learn but study—that is, to work as his own boss to the limit of his powers" (1944, p. 24). Intellectuality is the best antedote to authoritarianism: whereas recipe knowledge makes a person more dependent on authorities who create and disseminate knowledge, the growth of intellectuality makes the student more independent of the teacher.

There is no reason to think that the future holds less technological advance; therefore, the future certainly holds more recipe knowledge for everyone. But if the future will bring a more widespread understanding of the character and limitations of recipe knowledge, and a reestablishment of the value of traditional knowledge, then the growth of technology will harmonize with the advancement of science and the humanities.

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