

Fundamental Research and Education¹

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Ideas about the relationship between fundamental research and education are commonly limited by a stereotypic view of what that relationship is. The stereotype can be described as a dialogue between a research psychologist, assumed to be a university professor, and a classroom teacher: Using the results of research, the professor advises the teacher how to teach. That stereotypic view of the connection between research and education generally assumes that the knowledge of greatest value to educators specifies, at least ideally, a set of pedagogical "dos" and "don'ts," and that the prime consumer of that knowledge is the classroom teacher. These assumptions have been widely held since the development of psychology as a science; they were a force in the creation of many schools of education and guided early educational research. Their popularity is understandable, for given the subject matter of psychology, it seems reasonable to expect it to be of direct benefit to persons whose occupational concerns are interpersonal. And yet, they are unwise assumptions, for they tend to act as a set of blinders, closing off a fuller

view of what education can gain from research.

What is needed is a breaking out of the stereotypic view. The results of research and the practice of teaching are related in many more ways than as a dialogue between a psychologist and a teacher. First, the research side of the dialogue includes representatives of all the social and behavioral sciences and some of the humanities. Each relates in a fundamental way to the complex process of education. Physical and natural scientists should also be represented, for they contribute much to what educators teach.

Second, the teacher's side of the dialogue includes administrators, school board members, textbook writers, and all kinds of educational specialists as well as the state and federal legislators and other policy makers whose decisions help to shape the educational system. The cast of educators grows quickly, for the concept of education involves far more than schooling, no matter how close the pairing of education and schools in everyday thought. Families educate, as do peer groups. Education goes on in churches and

work places, in libraries and museums, and in front of movie and television screens. Any discussion about the relationship between fundamental research and education cannot be restricted to what goes on in schools and classrooms. It must break out of those boundaries if it is to treat the panoply of settings in which people become educated.

Having enlarged the cast of characters, however, we are still faced with a metaphorical dialogue that does not do justice to the relationship between research and educational practice.

There is no army of educational practitioners expectantly waiting to hear what the fundamental researchers have to say, nor is there a corresponding group of researchers. The truth is that most practitioners do not turn directly to researchers for advice, nor do most researchers offer it. The two groups talk more among themselves than they do to each other—and so they should if they are to do justice to their respective tasks. The metaphor does not jibe with the facts.

Introducing a third party to the dialogue, whose job it is to facilitate communication between the first

two, might improve the usefulness of the metaphor. This group, the “disseminators,” would include the popularizers, the translators, the journalists, and the reporters, who put the writings of the fundamental researchers into a form that is useful to practitioners. Professors of education who extract practical implications from work that appears not to have any may also act as disseminators.

The introduction of disseminators may add a touch of realism to the dialogue, but it does nothing to free us from the limitations of the belief that the ultimate contribution of fundamental research, from whatever source, is to tell the practitioner how to teach. To escape from the constraint of that belief, we must turn instead to thoughts about thought itself, particularly those of educational practitioners. The goal is to find some way of describing in general terms the possible linkages between research, on one hand, and the practitioner’s world, on the other.

Conventionally, we think of practitioners as doers, people who apply skills and knowledge to the solution of practical problems. It follows from this view that to help practitioners is to influence their way of doing, to influence their actions, in the settings in which they work. Hence, we come to the conclusion that the results of research (or for that matter, any other activity purported to be of value to practitioners), leave their traces in some modification of that activity we call “practice.”

This view of the practitioner is too simple. Certainly, practitioners have changed and improved what they do as a function of what scholars and researchers have said. Sometimes those changes have been dramatic and the lines of influence direct. Quite often, however, the shifts in practice are caused indirectly—their scholarly roots buried in a tangle of causal agents that include public opinion, political expediency, and practical necessity. In short, the conventional view of practitioners and how they change lacks subtlety.

The conventional view has another, more important weakness: It fails to acknowledge the special perspectives of practitioners. In so doing, it obscures what stands to be changed other than the practitioner way of doing things. We need a framework within which to discuss the approach of practitioners to their profession—their manner of thinking about what they do. We find it helpful to discuss the perspectives of educational practitioners in terms of four groupings: (1) a view of reality, (2) a vision of the achievable, (3) know-how, and (4) a commitment to act. Each of these constitutes a region of influence—a set of ideas, beliefs, and opinions vulnerable to change. Fundamental research relevant to education is but one set of forces—though an important one, we believe—contributing to changes in each of these groupings. Even as heuristic devices, the four groupings require a much fuller elaboration than can be given here, but we present a sketch of their meaning.

“A view of reality,” as the phrase is used here, refers to the educational practitioner’s way of seeing the world, together with the language used to talk about that world. It also refers to the relative importance attached to what is seen and talked about, the notion of valuing. In the most general terms, then, it contains the practitioner’s answer to the question of what is real and what is important, insofar as that reality pertains to educational matters.

To a large extent, the practitioner’s view of reality is commonsensical and shared by us all. All of us, if called upon to describe the contents of educational settings, would be quick to identify teachers, students, textbooks, and most of the other physical paraphernalia commonly found there. We would also claim to see that students differ from one another in their psychological makeup, that teachers carry certain responsibilities, and that some textbooks are better written than others. Yet even these shared perceptions, these common facts of life, differ in salience for those who are practitioners and those who are not.

In addition, even more specialized

ways of seeing and speaking, which educational practitioners do not necessarily share with the rest of us, tell us something about how they see the world. Words like overachievement, hyperactivity, cultural deprivation, and reading readiness stand for a way of looking at things that sets their users apart from others.

The manner by which practitioners acquire their view of reality is as complicated as the view itself. Part of it doubtlessly derives from the common events of life, a portion is surely attributable to professional training, and another to professional experience. The question of how fundamental research contributes to this view is in itself worthy of serious investigation. For example, one might trace the roots of the remarkable change in views of gifted pupils that educators have undergone. Having abandoned the widely held misconception of the gifted as socially immature, physically weak, and prone to insanity (a view challenged by the research of Hollingworth and Terman, for example) practitioners began debating the merits of skipping grades, special classes for the gifted and talented, and various means of challenging their brighter pupils. Even without such an investigation, however, we can readily see that concepts of social class, intelligence, bureaucracy, ethnicity, cognition, and others used daily by practicing educators had their origin in the work of scholars and researchers or have had their meanings modified by that work.

“A vision of the achievable,” as the term implies, refers not to what is, but what might be. It encompasses a view of the future, expressed in terms of purposes, goals, objectives, or aims. All purposive action implies such a vision. A vision of the achievable includes such narrowly defined goals as curriculum objectives of the sort found in lesson plans and teacher guidebooks, of course, but it also embraces vaguer hopes and grander expectations, including aspirations sufficiently broad in scope to shape policy and to inspire action. When educators speak of producing good citi-

zens or helping to erase social inequities, they are expressing a portion of this vision.

As is true for the educator's view of reality, the sources of these visions of the achievable, large and small, are rooted in a causal network too complex to unravel completely, yet changes in that vision have occurred over time. It is now thought, for example, that far more people of all ages and stations in life stand to benefit from formal schooling than was thought to be so a generation or two ago. This belief was bolstered by fundamental research: "The quality of intelligence can be modified." "Our inner-city schools are not 'hopeless'." "The severely retarded can be taught." Fundamental research contributing to these expectations has included animal and human studies of deprivation, social psychological studies of children's attitudes and self-esteem, family interaction and prejudice, and investigations of environmental disadvantages and of childhood in other countries.

Work on the remediation of serious physical and psychological handicaps has inspired, in the last fifty years, an entirely new branch of educational endeavor and a willingness to spend time on people who in earlier generations were neglected. The kinds of research and scholarship that have revealed the conditions of the underprivileged in this country and throughout the world have served to intensify educational efforts to overcome the devastations of cultural and social impoverishment. Each new advance in understanding of how the mind works, each contribution to thought that serves to deepen the appreciation of social justice, has the potential of altering educational vision.

"Know-how" is an old-fashioned phrase that means craft, technique, procedure, plan of action, method. In addition to seeing the world in a certain way and extending that sight into the future in the form of goals and objectives, educators must be prepared to act. They must know what to do to attain the goals they envision. When people seek to understand what fundamental research and scholarship might contribute to the teacher or the school admin-

istrator, know-how tends to get exclusive attention.

Educators, however, need more than a set of procedures for carrying out their work, crucial though such procedures might be. Traditional concern with translating the outcomes of research into a plan for action is not so much wrong as excessively narrow. Moreover, the narrowness derives from more than the fact that practice per se has been the focus on the search for a linkage with the world of scholarship; it also has to do with the almost total absorption with the goal of improving practice and discovering better techniques. We seldom ask whether educators might now be doing as well as can be done in many aspects of their endeavor. We might pay more attention to the possibility that educators may deserve and benefit greatly from some external confirmation of the appropriateness of much that they are now doing.

For example, there are hundreds of children who are obviously bright but are not very good students. Sensitive teachers give these children emotional support and encouragement, raising the children's self-esteem. Basic research suggests that many of these teachers are doing as well as anyone could, given what we know and what we do not yet know. We do know that skills mature at different rates: Some children will be quick to learn addition and slow to ride a bike; others will be slow to learn to add but quick to learn to ride. We know that all of these children need confidence in themselves and support from adults who expect they will eventually succeed. We do not know why these children differ, and trying to "prevent" the differences by tampering with curricula, desks, noise levels, and so forth is simply premature. Using what we already know about children and their development and building on that knowledge is more sensible.

So long as we remain fixed on the goal of improvement, we tend to overlook the many kinds of support for the efforts of educators that knowledge from the social sciences or elsewhere might provide. We

tend to forget that a firmer rationale for current practices might prove a greater boon to the vitality of educational efforts than would an entire compilation of suggestions about how to improve this or that pedagogical technique.

Finally, the educational practitioner, by definition, is not simply a person who knows how to do something—teach a class, run a school, plan a curriculum, design a test, or what have you—but is also a willing actor who practices with some degree of enthusiasm. The willingness of practitioners to continue their work, which we are calling a "commitment to act," can be strengthened or weakened by a vast number of considerations, ranging from such mundane matters as salary and working conditions to those principles that can add a sense of vocation, a calling, to work. That sense of calling makes of the practitioner, not simply a person performing a task, but also a person of principle.

It is difficult to speak of the commitment to act without leaving the impression that all educational action is inspired by noble thoughts. Such an idealized image is of course false. Yet we also know, or at least suspect, that if all such thoughts were absent, if the practice of education were motivated by nothing more than the need to make a living, the enterprise itself would falter. It is imperative, therefore, to understand how to sustain this sense of mission in practitioners.

Is it not possible that fundamental research may in some fashion contribute to practitioners' commitment to act? Certainly we can imagine educators thinking about what they read and how it relates to their work. Such an attitude of seriousness in reaching out for deepened understanding is itself an expression of the practitioner's commitment to act. A person's seriousness feeds upon the seriousness of others, and sound scholarship provides a rich resource.

Thus, one way of describing the manifold connections between fundamental research and the practice of education is to establish the potential of such research to alter

practitioners' views of reality, to change their conceptions of what is educationally possible, to offer them better ways of working as well as an improved rationale for their actions, and to deepen their commitment to their work. Though admittedly incomplete, this conception of how research might have an impact on education is offered as a substitute for the conventional stereotype of omniscient scientists telling teachers how to teach.

How do we know that fundamental research does indeed influence educators in the ways we suggest it may? The usual reply to such a query, even when limited to the traditional link between research and practice, is to select dramatic examples that will overcome the critic's doubts. Typically, a search turns up the names of past greats, such as Freud, Dewey, and Thorndike, or outstanding contemporaries, such as Skinner, Piaget, and Mead, whose ideas have obviously left their mark on both thought and practice in education. The work of these people is surely concrete evidence that fundamental research makes an important difference in educational affairs. Educators, parents, government officials, and other people throughout the world see reality differently and talk about it differently as a result of what these few people have written and said. Educational goals and practices have clearly been modified as a result of their seminal ideas. It is even possible to gather testimony that would show that the educator's commitment to act has in many instances been strengthened by the insights of these scholars.

Offering such examples as evidence of the importance of research, however, neglects the vast bulk of scholarship (and, therefore, the great majority of scholars) in favor of a few of its stars. So constrained, we limit the search for effects that, as it were, have surnames attached to them. In doing so, we ignore many ideas that have profoundly affected educational practice; because they have come from so many different sources and have been reinforced by the writing of so many different scholars, they have become, in effect, anonymous.

Consider, for example, research on reading. The sources of significant contributions to this research include major universities and research institutes on three continents—North America, Asia, and Europe. This international community of scholars has begun to understand why learning to speak is so easy but learning to read, for many, is so difficult. They have learned, for instance, that being able to hear, segment, and repeat phrases, words, and phonemes found in the flow of speech is one important precondition for learning to read; and that "segmentation" can be taught to those to whom the skill comes slowly. This work cannot be summarized by pointing to one or two great people but must be characterized as a cumulative flow of ideas from many sources that have outlined what can be done to improve a child's readiness to read.

If we focus in particular on an individual's contribution to education, it is easy to neglect the work of many people to bring that contribution into practice over the years. For instance, we are indebted to Jean Piaget for the concept of sensorimotor intelligence in infants; his work forty years ago changed the view of infant behavior from one of helpless, reflexive activity to one of intense interaction with the environment, undergoing systematic changes. Piaget's descriptions of infant development stimulated an enormous amount of research (particularly during the 1960s) on infant behavior: how well they can discriminate a wide variety of stimuli, learn complex associations, and, in a sense, control their social environment by eliciting stimulation from parents. Myths about what babies could not do collapsed as scientists, with new or improved techniques, demonstrated what they could do. This research had tremendous implications for the appreciation of both nature and nurture in the development of the human infant, for knowledge about individual differences, and for the capacity to help children who do not develop normally or who are "at risk." The realization of the infant's rich behavioral repertoire had led today to a whole new field of endeavor,

aimed at identifying the infant-environment combinations that will elicit, maintain, and maximize developmental potential.²

The influence of fundamental research, therefore, is far more significant than a set of biographical examples indicates. Scholarship in general enters the minds and colors the actions of educators through a series of filters that are as yet poorly understood. What is needed is some way of describing this filtering process.

A beginning approach to that wider view, but one that still keeps us too closely attached to the contributions of individuals, is to examine the bibliographic sources used by educational writers. For example, a review of the references cited in Charles Silberman's *Crisis in the Classroom* (1971), surely one of the most widely read educational books of this decade, reveals not simply the names of the six scholars we have mentioned, but literally dozens of others, including economists, anthropologists, sociologists, historians, philosophers, literary and social critics, jurists, and even a political leader or two.

Or consider another influential book of the late 1960s, Rosenthal and Jacobson's *Pygmalion in the Classroom*. Among approximately 230 references, one finds not only the psychologists, who might be expected to be referenced in a work that is largely psychological in character, but also scores of others from related disciplines. In a volume as exclusively educational as a recent Yearbook of the National Society for the Study of Education, entitled *The Curriculum: Retrospect and Prospect*, the index is dominated by reference to educational writers, as one might expect, yet we also find there some interesting surprises: names like Niels Bohr, Kenneth Boulding, Sir Kenneth Clark, Edward Hall, David Hume, and C. Wright Mills.

An examination of references in the periodicals of education shows a similar diversity of sources. Our own limited review indicates that the journals of education draw heavily on fundamental research. The

educational magazines, written for the practitioner, also cite basic research. In fact, among the top twenty periodicals referenced in educational periodicals, approximately half are basic research journals representing an array of disciplines: psychology, sociology, economics, statistics, linguistics, political science, and anthropology.

Now it is a large step and a dangerous one to move from even a brief examination of bibliographic citations to the conclusion that the works cited have had a real influence in the field of education. The majority of such attempts to trace the impact of research fail to prove whether (or to what good) research influences practice and indicate only where research may have had impact.³ For example, one finds in the writings of educators throughout the twentieth century references to fundamental research used to bolster the movement to gear texts and curricula to student abilities. The beginnings of that movement, however, antedated the scientific research, and it was surely given impetus by such social phenomena as the increasing sophistication of teachers, whose average years of schooling advanced from twelve in 1900 to about seventeen in 1970. Nonetheless, large bodies of research show remarkably close ties with changes in practice. These changes—the assignment of different textbooks to pupils at different grade levels, the placement of children within classes in different reading groups, and the abandonment of useless, boring, and difficult tasks, on which a large proportion of students invariably failed—all required a new way of thinking about children. Fundamental inquiry has supported, even provoked, these intellectual revolutions.

We might ask at this point, if so many already contribute to educational inquiry, why make a special effort to encourage others? Furthermore, if the dynamics of influence are actually opaque and mysterious, does not supporting fundamental research in the hope of a salutary effect on educational practice or practitioners become a very risky business indeed? Finally, if educators truly feed on such intellectual resources, how is it that in their

actions they falter so? If so much knowledge is available, why do we continue to hear of falling test scores, vandalism in classrooms, poor readers, and college graduates who can barely write grammatical sentences? These are tough questions. They require much fuller answers than can be given here, but we can point toward the directions in which those answers may lie.

The openness of the model of influence being proposed here, together with the vagueness of its operation, is troublesome. It allows ideas from almost anywhere to insinuate their way into the consciousness of educators and there to influence how they look at the world and act upon it. Such a model suggests that educators already have more than enough ideas.

Of course, there is always a shortage of good ideas, and always room for new knowledge. But this statement alone is unsatisfying, for it does not tell us what “good” means within the present context and does not contain any hint of what new knowledge should be pursued within the many intellectual domains open to exploration. Ideas that are good in the sense of the word used here are those buttressed by rational and empirical arguments, which are the kinds of arguments offered by scientific research and disciplined scholarship. Some knowledge, on the face of it, is closely related to the substantive concerns of educators, some more distantly so. Within broad limits, it is the former to which we would give preference in seeking support for new endeavors.

These considerations lie behind the contention that serious thinkers in the social and behavioral sciences and the humanities such as philosophy or history are likely to affect the collective consciousness of educators. Their task is to understand better how, where, and why people learn and mature. The history of science suggests that we should hesitate to predict the impact of new knowledge, but research on the brain will surely turn up insights that find their way by some circuitous route into the thinking patterns of educators, and research into the origins and maintenance of social

class structure is likely to do so. The pursuit of both efforts entails some risk, to be sure. There is obviously no guarantee that any research, fundamental or applied, will have beneficial consequences for educational practitioners. This does not mean, however, that it is absolutely impossible to predict which are likely to yield such results or to judge which have yielded results. In the end, we can judge by the evidence of use—whether the old idea, like the kerosene lamp, is discarded because the new idea, like the electric light, is more useful, sensible, and efficient.

The problems that continue to plague educational efforts, and schools in particular, are indeed an embarrassment, especially so in the light of all that has been written and said to aid the process of education. Why have we not yet learned how to eliminate reading problems? Why is learning how to write correct English still such a mystery for so many?

There is an easy answer to such questions, but it is not very satisfying: Human beings are complex creatures, far more complex than the most complicated machine that they themselves have ever built. Small wonder, therefore, that we have only begun to probe the mysteries that contain the answers to educational strivings. Such a reply is undeniable but very frustrating, for it implies that we shall be saddled with the same problems for a long time to come. Yet it is also possible, if we look back, to gain some solace from the genuine progress that has been made.

The glacial advance of human understanding is a topic about which volumes have been written. More are clearly needed, for as yet we perceive the signs of social growth only dimly. Indeed, there are some who would claim that we commonly misperceive those signs, mistaking novelty for improvement, retrogression for advance. In education, it is especially easy, given the vexing problems that remain, to lose sight of the slow advance, easier still to mistake change of any kind for progress. Yet it is important that we remind ourselves from time to time of how far we have come.

We see first, even without a statistical gauge, that more people are attending school today than ever before in the history of mankind. Moreover, the fullness of that experience for the average person, the portion of his or her life and the amount of time and energy invested in the process, is also greater than ever before. We can also see that the quality of education as a human experience has undergone marked improvement over the years, not only between some distant historical point and now, but also within the lifetime of most adults. The curriculum of schools and colleges, for instance, has never been more varied in scope and variety. High school students are learning now what was once thought to be college-level material, and elementary students are acquiring skills that used to be taught in high school. While some might argue that it has become too ambitious and that we should not be trying to teach so much to so many, there is no doubt that the varied fare that schools offer today is an advance over the three Rs of our grandparents' day.

Consider also the instructional materials used in the service of today's enriched curriculum—textbooks, workbooks, films, tape cassettes, TV programs—all designed to enhance the attractiveness and efficiency of the learning experience. Again, it is possible to dismiss some of these new resources as mere gadgetry, but even the most nostalgic critic would have to admit that we

have come a long way from the days when lessons were taught by word of mouth and recitation books.

And what of the classroom? Going forever, we would hope, are the hickory stick and the dunce's cap. Fast disappearing, too, are other forms of discipline that thousands of pupils have suffered in the past—rapped knuckles, standing in corners, sentences copied as punishment, and demerits for whispering in class. Also gone or going is excessive reliance on rote memorization, the parroting of answers to questions that were only partially understood, and the soporific boredom of the recitation method. The treatment of pupils has clearly become more humane over the years.

The gradual elimination of cruelty from classrooms is only one of several advances in pedagogical practice. There is also an increased tendency to treat each learner with greater dignity, to perceive each student as an individual, to shape an educational program in response to that perception, and to afford each person a wider range of choices and encourage active participation in the learning process.

Certainly the Progressives, Dewey among them, had a hand in this development, but a fuller historical understanding reveals deeper roots to all of these ideas. Dewey's notions and those of his followers took hold, not because he had stumbled upon something new, but because he articulated what the human mind in a large part of the world was in the act of discovering—an evolving appreciation of human potential and

its release through the application of reason under conditions of increased freedom. That discovery has taken a long time—and we are still at it. Systematic, disciplined inquiry, which is but another way of saying fundamental research, can help to push it along.

Notes

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²For a detailed analysis of the research described, see Gibson and Levin on reading (Gibson, E. and Levin, H. *The Psychology of Reading*. Cambridge, Mass.: Massachusetts Institute of Technology, 1975) and Horowitz and Dunn on infant development (Horowitz, F. D. and Dunn, M. *Infant Intelligence Testing*. Paper prepared for the Conference on Early Behavioral Assessment of the Communicative and Cognitive Abilities of the Developmentally Disabled. Under the auspices of Communication Disorders, Mental Retardation and Developmental Disabilities Branch, National Institute of Child Health and Development. Lawrence, Kansas, University of Kansas, 1976.) In the United States, most of this work has been supported by the National Institutes of Health, the National Science Foundation, and the National Institute of Mental Health. The Office of Education has sponsored research on reading, as has, more recently, the National Institute of Education.

³For a major review and discussion, see Clifford, G. *A History of the Impact of Research on Teaching*. In Robert Travers, (Ed.) *Second Handbook of Research on Teaching*. Chicago: Rand McNally, 1973.