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AUTHOR Schramm, Wilbur
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ABSTRACT

"Good teaching" is notoriously difficult to measure. It may be possible, though, to say where a teacher stands on a scale of development which has four stages. In the first stage, the authority is the teacher, and the student gives back rote responses. In the second stage, the authority is the text or syllabus, and the student asks questions only to clarify the assignment or get a fact. In the third stage, right answers are derived from evidence rather than the text, and the student begins to discuss and ask thoughtful questions. In the fourth, the student decides for himself what the authority is and spends his time in individual work. Questions which may gauge the stage of development of a teacher include how much the teacher talks, what kind of questions he asks, what kind of questions the student asks, what kind of study materials are used, how closely the teacher follows the lesson guide, if any, and how many topics refer to the student's own environment. (JK)

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MEASURING EDUCATIONAL DEVELOPMENT THROUGH
CLASSROOM INTERACTION

Wilbur Schramm

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This is one of a series of reports of research on the Educational Reform Program of El Salvador, and especially its use of instructional television. This report has been prepared by members of the Institute for Communication Research, Stanford University, on behalf of the Academy for Educational Development, under contract with the U.S. Agency for International Development.

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These notes grew out of our thinking about research on El Salvador's broad program of educational reform, of which instructional television and teacher in-service training are among the major components. Because the ideas may be useful elsewhere, they have been set down in this memorandum.

We are making a deliberately naive approach to a very complex subject. Throughout all the history of education there has been no broad agreement on what constitutes good teaching or a good teacher. One reason for this is that there are many outcomes of education and different ways of achieving them. Some are difficult to measure if they can be measured at all, and others cannot be known until long afterward. A judgment on good teaching therefore often involves us in value judgments in an area where the hard evidence is often insufficient. How shall we evaluate, for example, a teacher who by example apparently teaches us honesty and kindness, but little arithmetic, against another teacher who teaches us to add, subtract, multiply, and divide, but little about human decency? How shall we evaluate a teacher who makes us miserable in high school mathematics, although some of us look back in later years with the greatest of gratitude for that stern pedagogy? How shall we evaluate a teacher who systematically and clearly covers the assigned subject matter, against another who is unsystematic and fails to cover important areas but imparts some intellectual curiosity? How shall we evaluate a Socrates who could provide unequalled challenge to highly superior students against a teacher who would be of no use to Socrates' students but

is highly effective with retarded or deprived students? Questions like this have always stood in the way of measuring "good" teaching. The subject therefore has usually been talked about in rather general terms, and more often in the spirit of philosophy and exhortation than in the spirit of science.

Why try to measure at all what happens in the classroom? Why not be content with measuring the end product -- what the student learns, and how he changes in the course of being taught, at least insofar as those results can be measured? The reason is that we should like to know what kind of teaching, what kinds of classroom experience, bring about different learning results. We should like to know how to train teachers. And, especially in developing countries and developing school systems, we should like to be able to help teachers climb the ladder toward modern pedagogy, just as we help farmers, technicians, managers, and doctors move toward modern skills and practices.

There are, to be sure, some excellent instruments for describing the interaction between teacher and pupils in a classroom. The Flanders measures are an outstanding example. There are also numerous evaluative instruments, among them the IOTA (Instrument for Observation of Teacher Activity) and the Robertson Teacher Self-Appraisal System. Typically these require highly expert observers, who need a number of hours of training before they can achieve inter-observer reliability.² They are not the kind of tools that could be used readily by a school supervisor or a utilization officer trying

to help a teacher in a developing school system. Furthermore, they are made for, and fit better, the schools of economically advanced countries than those of developing countries.

Suppose we begin, not by trying to measure the "goodness" of teaching, but, rather, by trying to say where it stands on a scale of development which schools are believed to go through as they move from the earliest stage -- the child learning from the parent or the elder what they learned from their parents or their elders -- to the most modern, where the emphasis is on the child learning to seek and solve problems that are relevant to him, working at his own pace, with the whole machinery of the school being used to stimulate and support rather than regulate him. Somebody has called this the Path from Wallaby to Winnetka.

One typology of this kind has been presented by C. F. Beeby in his book, The Quality of Education in Developing Countries, to which we gratefully acknowledge a debt. The pattern we are going to suggest is much like that of Beeby's, but differs from it in certain important respects, and we shall move on, as Beeby does not, to inquire how progress along the path could be measured.

What is the path that an educational system follows as it moves from Wallaby to Winnetka?

In the earliest human societies children learned at their parents' knees. Their mothers passed on to them the legends and customs of their people, and their fathers taught them to hunt or fish. After a time some of these duties were taken over by some of

the most expert among the adults -- the best storytellers, the priest, the best hunters or warriors. When labor came to be more and more differentiated, the role of teacher was recognized. As late as 1800 in the United States and Europe, many schools still existed in which untrained teachers passed on to young children the rudiments of counting and writing and spelling, taught them the favorite poems of earlier generations, and the favorite stories out of the national history -- just as the teacher had learned them, and in the same way. This is what Beeby calls the "dame school". We have never seen schools of this type in El Salvador, but have seen them in certain other developing countries.

The next stage in development comes when the curriculum is formalized with a syllabus. The teacher is better trained than the "dame school" teacher, but not well enough trained to be confident of his ability to depart from the syllabus, or from the drills and teaching suggestions contained in his teachers' guide. Schools like this are very common in developing countries, El Salvador included. At this stage of development, the syllabus acquires a degree of authority that might startle the people who wrote it -- principally because the examinations are based upon it, and upon the examinations often depend further schooling and careers. This is particularly true of some former colonies. Many a Peace Corps Volunteer who has tried to liven up a course in Africa by digressing from the topic has been startled to hear his students shout at him, "N.O.S.!" -- meaning, "Not on Syllabus," and therefore a waste of time. Similarly, the teachers'

guide takes on an authority that sometimes surprises the authors of the guide, principally because the teacher is uncomfortable departing from it. When television is introduced into a developing country, many classroom teachers have to deal both with unfamiliar subject matter and unfamiliar teaching methods, and consequently hold on for dear life to their syllabus and guide.

At this stage of development, the student does not do anything much different from what he did at the "dame school" stage. He listens, he drills, he gives the teacher back what he is expected to, and he chants many of his responses. The chanting drill, in which the class responds in a common rhythm almost like a chorus, is heard all through the developing countries. The student, at this stage, does not ask many questions, and almost never ventures an opinion.

One more step up the ladder, and a great change becomes visible in the classroom. No longer is the teacher so poorly prepared that he feels ill at ease with new math or the second language and must hold on to the syllabus as to a life preserver. No longer is he so little trained that he must parrot the exercises he has been given in the same way as he expects his pupils to parrot the answers. He feels free to vary from the syllabus when necessary in order to make the points apply to the experiences and interests and future needs of his students. He feels able to introduce new classroom activities of his own, and tries to enrich the school time with learning aids and class projects. He feels able to ask questions that have more than a single right answer, and so some of the question-and-answer time turns into discussion, rather than drill.

An even more spectacular change comes over the students at this stage. In earlier stages they have been silent, for the most part, except when called upon to recite or to join in a drill. If they have asked questions, it has usually been for instrumental reasons -- what did you tell us to do, Miss So and So? Where can I find a ruler? May I leave the room? -- or to clarify something -- what did you tell us to do? Now they begin to ask thoughtful questions -- what is the meaning of this? Is this really true? What would happen if the conditions were so and so? They begin to relate their own experiences to what they are learning in class, and feel for the first time that what they have seen and done may be worth talking about, and their opinions sometimes worth voicing. Bit by bit, the locus of authority in the classroom begins to change from the teacher and the syllabus or text to the consideration of evidence in the environment. The function of the class is no longer to learn by rote what the same school teacher gives them, or to learn to give back the syllabus, but rather to apply these points to the world they know, and even sometimes to challenge them. As this takes place, the chanting drills come to be heard less and less often, and are replaced by class discussion and student projects.

In a fourth stage, the teacher is well informed, well trained, confident in his ability to guide individual students along the paths to learning that seem most promising for them. The spirit of the classroom now is that an individual must decide for himself, on the basis of the best evidence available, where authority lies in any

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given area of knowledge. Not all the answers have been found and some of the old answers are questionable; knowledge is still to be sought. The learning experiences become individualized. Not that lectures or drills cease to play a part in the classroom process, but increasingly the students take responsibility for their own learning, and under the teacher's guidance move forward at their own pace, often working on projects and problems of their own choice. Discussion is even more important than in the previous stage. Students often challenge statements heard or read in class. The classroom is no longer an echo chamber for the teacher, as in the first stage, or a controlled exercise in rote learning, as in stage two, but rather a situation in which the teacher is a senior partner in the experience of learning, but every member of the class is also a full partner responsible for his own progress, for his own drill (perhaps with the aid of programmed instruction or CAI), and for contributing to the learning experiences of others. And as this happens some of the time-honored accoutrements of schools begin to disappear - the division into grade levels, the rigidly scheduled day, the frequent giving of letter grades, and so forth.

▷ We have tried to summarize these stages in the following chart:

Authority is	Teacher is	Teacher does	Student does
<p>Teacher</p> <p>Syllabus or text</p>	<p>Little trained, if at all</p> <p>Poorly informed</p>	<p>STAGE ONE</p> <p>Presents items for rote learning. Tells stories. Directs recreation</p> <p>STAGE TWO</p> <p>Follows syllabus closely. Lectures or drills as directed by syllabus or teachers' guide. Asks mostly questions with only one correct answer and drills students to give that back to him.</p> <p>STAGE THREE</p>	<p>Learns to give back the drill or fact items he hears from teacher. Class learns to chant responses.</p> <p>Listens passively, and engages in drill. If he asks questions, it is usually for clarification of assignment or fact.</p>
<p>Right answer's are derived from evidence rather than text; ergo, not all right answers are found in text.</p>	<p>Well enough informed to be confident of dealing with subject matter without parroting text or syllabus; well enough trained to be confident of ability to depart from teachers' guide.</p>	<p>Departs, sometimes from syllabus to make subject matter fit student needs or experiences, or current happenings. Departs from guide sometimes to introduce new classroom activities. Asks some thought questions (those that have more than one right answer), and encourages discussion. Enriches school time with class projects and learning aids.</p> <p>STAGE FOUR</p>	<p>Responds to drill and listens to lectures, but also asks questions some of which are thoughtful rather than for clarification. Feels some of his own experiences are important enough to talk about in class. Discusses. Works on projects, sometimes individually or in groups smaller than whole class.</p>
<p>An individual must decide for himself what the authority is.</p>	<p>Well informed, well trained, confident in his ability to guide students, and in their ability to work on their own.</p>	<p>Individualizes the learning experience in the classroom to apply to needs, interests, abilities, and progress of individual students. Encourages individuals to seek and solve problems relevant to them, and encourages them to make up their own mind and express own opinions.</p>	<p>Student listens and drills as before, but spends larger part of his time in discussion and individual work. Asks questions that challenge statements heard or read in class. Works a great deal on his own, at own pace, carrying out assignments and examining problems and questions of his own choice.</p>

If stage four seems idealistic, it is. Not many schools, even in highly industrialized countries, have reached it. There are schools, in remote areas and less-developed countries, still in stage one. Most schools in El Salvador are probably in stage two or stage three, and the movement is from two to three. Most schools in the United States are probably in stage three, with the movement toward four.

The movement of schools along this path of development is apparently irreversible, barring some great catastrophe that would destroy much of the culture. It reminds one of Whitehead's whimsical statement in explaining Newton's Second Law, that the only way one could tell whether a movie of the universe were being run backward or forward is to notice whether entropy increases, for the Second Law shows that entropy always increases with time. Similarly, a developing school system, so far as we have been able to observe, always moves away from what we have described as stage one in the direction of stage four.

It may be misleading to describe the path as four stages. Certainly, a country or a school does not take three giant steps from stage one to stage four. It takes many tiny steps, and progress is often slow and uneven. The four stages we have suggested are only points on a continuum.

An expert observer, given a typology like the one we have presented in this memorandum, could say in general terms whether a class is functioning approximately on the level of stage one,

stage two, stage three, or stage four. However, we need measurements that can be applied by observers who are not great experts, and we need something both more reliable and more sensitive than a general conclusion that a teacher and a class are about at stage two. We need to be able to recognize changes that take place in a relatively short time. We need to know whether a teacher and his class are moving along the desired path, and where progress lags, if it does.

What can we observe in the classroom to answer some of those needs? More specifically: What are the items that can be observed reliably by supervisors who are not really trained as researchers?

These restrictions eliminate some of the possibilities. As attractive as it would be to obtain a sampling of class time -- for example, checking off every three seconds what is going on in the classroom, as some of the instruments do -- we are led to believe that this cannot be expected of supervisors who are not trained as researchers. At least so we have been advised; if that is incorrect, we can then build an instrument on a time base. Again, it would be very hard to obtain reliable qualitative judgments of some things it might be useful to know -- such as the students' apparent level of interest, the teacher's ability to maintain attention, or his skill at sensing the readiness or the optimum performance level of his students. It is not impossible to think of making an objective measure of interest or attention, but that is a later and longer task.

What, then, can we measure? We shall have to find out partly by trial and error. But here are a few suggestions.

In the first place, how much the teacher talks as compared to how much the students talk or work on their own tasks. In Salvador, the Plan Básico classes using the old curriculum without television are mostly lecture. When television is introduced, that is largely lecture, and the pre- and post-television times are used chiefly for drill or further exposition by the teacher. As a classroom moves toward the third stage, however, it is reasonable to suppose that the proportion of student talk would increase. Ideally this measure requires a time sampling, but the differences appear to be so gross that a five-point or seven-point observational scale is worth trying, to see whether it will yield useful results.

What kinds of questions does the teacher ask? The proportion of single-answer questions (drill) to multiple-answer questions (thought and discussion) should increase dramatically as a classroom moves upward, especially from the second stage to the third.

What kinds of questions does the student ask? Our observation is that children in the first two stages, if they ask any questions at all, ask largely instrumental ones such as, what did you say the assignment was? or, where is the chalk? As they move through the second stage and into the third, however, they begin to ask, first, clarification questions (what does this mean?), and then thought questions (what would happen if . . . ? or, does this rule really apply to . . . ?). Therefore the number of questions of these three different kinds asked by students during a class hour should be a revealing measure.

What kinds of study materials are used in the class? At the first stage, there is likely to be none; the teacher is the source of knowledge. In the second stage, we are likely to find a syllabus or a text; and as the class moves upward from the second stage the number of learning resources increases significantly. It should be possible to make a list of these resources that could be checked off for any given class. These would include the learning aids -- pictures, maps, charts, demonstrations, and the like -- that usually begin to appear in stage two, increase greatly in stage three, and are individualized in stage four.

How closely does the teacher follow the lesson guide, if any? Inability to follow it is characteristic of pre-stage-two teaching, and ability to vary from it so as to develop new exercises or applications that are designed especially to fit the students in a particular class is characteristic of post-stage-two teaching. It should be possible, therefore, to set up a series of judgments based on knowledge of the lesson guide: does the teacher fall short of covering the topics adequately? does he cover the topics and exercises adequately? does he go beyond adequacy in the way described above? It may well be possible, by experimenting with measures of this kind, to obtain quite reliable observations.

How many topics, examples, materials used during the class hour specifically refer to the student's own environment and experience? This number might be expected to increase steadily from stages one to four. It should be possible to devise a list of different

kinds of materials and experience (e.g., examples in the lecture material, problems, visuals, demonstrations, etc.) under which locally oriented items could be checked as they occur.

What is the proportion of discussion to drill and/or recitation?

Here, as in some of the cases above, it would be best to have a time sampling, but the differences are likely to be so gross, and discussion so rare in the first two stages, that a five or seven point scale might prove to be feasible.

How many class projects are in evidence? How many individual ones? One would expect these numbers to increase, and the proportion of individual to class work to increase.

How many examples of individualization can be observed during the class hour? For example, does the teacher comment on individual papers or exercises? Does he spend time with individual students? How many students cite their own experiences in class discussion? How many students seem to be working on their own projects? How many are working on problems or practicing by themselves during the class hour? How many seem to be working at their own pace without being locked into the class rate of progress? These numbers should increase, especially as the class moves toward the fourth stage of development. It would seem possible for an observer to answer each of these questions either with a number (how many students cite their own experiences? or even with an all-or-none measure: does any student cite his own experience? does the teacher spend any time with individual students?). It might be well to begin with all-

or-none measures, and later to refine some of them to provide for counting.

There are many other possibilities, and the instrument used in El Salvador or elsewhere will have to meet the particular educational purposes and goals of the users. Therefore, these are merely suggestions toward an instrument, which will have to grow out of further thought, and out of trial by the kinds of observers who are expected to use it. But such an effort is well worth making.