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ABSTRACT

Discussed are the difficulties of implementing research findings in elementary schools; i.e. effecting a change at the level of interaction between teacher and pupil. An inherent difficulty is communicating research findings to the people in the local school systems who must act on them. The author states that even if this is remedied the following problem remains: convincing a person to act on what is to him unfamiliar information and to change his behavior when he has no readily apparent investment in the change. To solve this problem the author proposes involving teachers to the extent that they feel a part of the investigations and have some investment in their outcomes. From his own experiences he cites three ways in which this may be accomplished; the use of demonstration centers as training sites, getting as many teachers as possible actively involved in the research project, and urging teachers to try individual research studies within their own classrooms. (Author/CT)

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The Role of Research on Mathematics in Elementary Schools

by

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It is a very great pleasure for me to be here with you today and to be a part of this panel on interpreting and applying research in elementary school mathematics. My own presentation is going to be directed toward application of research in elementary schools rather than on how research ought to be conducted, on methodological considerations, and the like. And while this is a panel which is dealing with mathematics education, what I'm going to say will really apply in any subject area in the general field of elementary school practice.

My argument begins with the premise that education in a real sense is still very much like it was ten years ago or thirty years ago or even fifty years ago in that an instructional program is what goes on behind the classroom door. This is really the only true operational definition of it. In spite of all of our talk about technology and about instructional systems and the like, almost all of the load, at the elementary level especially, is still carried by the classroom teacher, working in direct contact with pupils. And consequently, when we say that we want a change in an instructional program, we necessarily mean that we want some kind of change in the behavior of the

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classroom teacher. I would therefore define the second most important criterion in the application of research results as the extent to which classroom teachers reflect the results in their own instructional activities. The first criterion, of course, is that the ultimate result is increased learning on the part of the pupils. But clearly, change in the classroom teachers' behavior is a necessary condition to improved instruction.

During the last ten years, I have been attempting to conduct research and/or evaluation in public school systems and to apply the results so that there can be some improvement in learning. I am sure my experience has been shared by a great many people in our audience today and by those on our panel. If we do an adequate job of planning, we will have the program well defined on paper. Administrative and managerial staff can then be set up, funds can be expended for different kinds of equipment and for instructional materials and the like, and there can even be in-service programs, and, in spite of all of this, the overall program itself can be something which exists on paper only so far as any real change in the experiences of pupils is concerned. Teachers, for any variety of reasons, will continue to behave in the classroom very nearly as they would have if the program did not exist.

Joe Mazur, former research director in the Cleveland Public Schools and now Professor at the University of South Florida, has indicated that the greatest problem in affecting change through Title I of the Elementary and Secondary Education Act is in program implementation, that is, in getting a change at the level of interaction between teacher and pupil. The creative evaluation model put together by Mal Provus when he was research director with the Pittsburgh Schools and reported in the 1969 ESSE Yearbook[1] as well as elsewhere, is largely concerned with determining what actually happens in the classroom and trying to

get information fed back on why teachers are not behaving as intended and why the program is not implemented. The 'P' in Daniel Stufflebeams' CIPP Model[2] is concerned with the same problem. There has been a good bit of research into this problem, but I beleive that I can state honestly, without fear of overly offending anyone, that solutions have not been forthcoming.

I am sure everyone here is familiar with the work of Paul Mork. More recently Everett Rogers of Michigan State has done extensive study on the problems of diffusion and dissemination of new knowledge in the field of education.[3] Coming from a background in agriculture, Rogers has attempted to apply the remarkably effective diffusion and adoption processes used there to education, and while his work is most interesting and productive, he has certainly met with limited success in actually producing change. Among others working in this area, Ronald Havelock of Michigan stands out as probably the most important current scholar.[4,5] He and others[6,7] have done important theoretical work, have outlined change models, and have defined the "change agent" role with precision. Yet, all readily admit that there is great difficulty nationally at present in getting educational improvements known and adopted.

While this type of university research has been underway, the U.S. Office of Education has been taking a series of large steps in the attempt to overcome the problems of communicating research results. Everyone is familiar with ERIC, of course, and probably with many of its successes and failures. Whatever else can be said about it, ERIC has been expensive, and there is little doubt that it has been a useful tool at the graduate and faculty levels in higher education. One of it's significant failures, however, is in the area we are discussing -- that is, in the attempt to get information into public school systems

and thereby to change the instructional process.

Why should it be that, with the goodly amount of sophisticated basic research already accomplished and with an investment the size of ERIC, we have experienced such great difficulty in affecting change in public school systems through the application of research findings? Robert Stake gave a partial answer to this question, I believe, in a recent talk to the Pennsylvania Educational Research Association in Philadelphia. Stake noted that communicating results from the researcher to the practitioner involves a two stage process. In the first stage, researchers write their results in their own esoteric language and from their point of view. These are the kinds of reports which usually find their way into the professional journals and into the ERIC System. These are not the kinds of reports, however, which are read very often by public school practitioners, either at the administrative or the teacher level. They are not easy reading to the layman, they are not in the language with which school practitioners are familiar, and quite often they do not lend themselves readily to suggestions for practical change in classroom practice.

Thus, according to Stake, a communication gap exists, and the second stage of the communication process is never completed. This stage involves taking information as it is produced by the researcher and repackaging it, this time with the user and his needs in mind. The information is put in the format and the language which are of optimum usefulness to the user.

I would agree with Stake that this is a major part of the problem. Certainly, I have found in my own work that one of the most difficult tasks in trying to get research results into action is in communicating them to the people who must act on them if the results are to have operational meaning.

The communications gap, then, constitutes a major problem and, as Stake suggests, it is based largely in the fact that in our attempts to communicate research results to teachers, to principals, and to others in the public school enterprise, we researchers keep trying to satisfy our own needs, and we forget that we must be user-oriented.

Bridging the communications gap will not solve the total problem, however. In my opinion, attempting to produce change through information produced outside of the school system by university or other researchers has inherent difficulties. Quite often producing change in this fashion involves urging a person to act on what is to him foreign information and to change his behavior when he has no readily apparent investment in the change. This attitude can be overcome, of course, as in agriculture, where it was made quite evident to farmers that their own productivity and therefore their profits would increase substantially through acting on the information. It might also be overcome in education if one had direct enough control over the reward system so that he could, for example, not pay teachers unless they exhibited certain behaviors. Neither of these conditions is likely to hold in education, because the gains that we are usually able to produce through some improved program design tend to be rather small and not at all dramatic, and teachers are now and in the immediate future will continue to be paid the same regardless of their productivity.

Under these circumstances, what are some alternative approaches to affecting change? The most reasonable answer here, in my opinion, is something I have found in my own personal experience, and it involves some rather simple principles of human behavior. One can affect change by giving the teacher a use of ownership in the research and in the activities produced through it.

One can produce change by getting the involvement of teachers so that they feel a part of the investigation and have some investment in its outcomes. I suggest that this can be accomplished in public school systems in three general ways.

First, if the research has been accomplished outside the system and one is bringing results in, more is usually needed than just providing a document for teachers and others to read. They need to become involved through overt behaviors on their part. We found in the Philadelphia School System, for example, that demonstration centers could be quite effective in this regard when they were used as training sites. In this situation, teachers did not simply come and look at what other teachers were doing, but they spent some time at the demonstration center themselves actually using the new techniques. We tried it both ways, of course. We had them just look and we also had them actively involved. When they just looked, their reaction seemed to be largely one of scepticism: "Of course it looks great," they said, "I could do as well if I had that kind of support and that level of students." The results were different when teachers spent time in the demonstration centers and actually taught there themselves, using the new techniques for a period of months. This is a type of inservice training, and it uses at the teacher level the old principle of learning and getting involved by doing.

A second method of changing behaviors is by getting as many teachers as possible actively involved in the research project itself, whether the project is conducted by the local district or by university faculty or by others. This was demonstrated over and over again in Philadelphia. But the most impressive demonstration of it in my background was in the Denver, Colorado, public school system. There we ran a project which ultimately had 1300 fifth and sixth grade

teachers involved. Most of these teachers, I think, actually had a real sense of ownership in the project, and this contributed substantially to the project's success in getting them to change their own classroom behaviors. I was a bit younger at the time and filled with knowledge about experimental design, covariance analysis, and the like, and I thought the extensive series of meetings with the Denver people was a waste of time. I really could not understand why we had the teachers together so much, why we kept explaining over and over to them what each phase of the project was meant to accomplish, and why their own participation in it was so important. It was only later, when I tried to do additional research in Denver and other locations, that I fully appreciated what had happened. The results of our work in Denver, which was funded by an NDEA Title VII grant, were published widely and made known nationally, but I would have to say in all candor that I doubt very seriously whether, in the years which have passed since our project was completed, we have affected the behavior of as many teachers nationwide as we did right in the Denver schools. The secret of that project, in so far as it was successful in changing teacher behavior, was that the teachers themselves were made part of the research. I feel this is an extremely important principle, and it needs to be followed throughout the country by researchers who are attempting to produce practical outcomes through their work.

There is a third way of changing teacher behavior through research, and this is something else that we tried and found effective in Philadelphia. The concept goes back to the early 1950's when the term "action research" was coined. This term fell under disrepute, I think, because it finally came to be used for any kind of attempt, systematic or otherwise, to try something new. What we did in Philadelphia was to try to bring some orderliness into the

process. We had a position, called a teacher-researcher, placed in several schools within the district. Teacher-researchers were people who had some training in research methods, and we worked with them very closely in giving them guidance and technical support. They continued to teach half of the time in their schools, but the other half of the time they worked on research projects with the other teachers. In this situation, the teachers in the buildings actually generated their own ideas and helped to design the reseach in which they wanted to be engaged. It was a kind of activity in which the sense of ownership was strong, indeed, and in which classroom behaviors were changed in very dramatic fashion. Some of the things these people came up with were not terribly sophisticated, so far as theoretical underpinnings of what they were about were concerned. Some of it was surprising, however, in its originality and in the degree of creativity shown. For the resources that went into this program, which amounted to half-salaries at the department head level for some ten persons, this was undoubtedly the most dramatic and successful attempt at changing teacher behavior that I have personally been connected with and of which I am aware. Unfortunately, the Philadelphia School System has been so wrought up in labor problems and in its own financial woes that it has not followed up very well with the teacher-researcher program. Be this as it may, I think that the principle is a very potent one. And I believe that school districts throughout the nation would be well advised to consider the possibility of placing teacher-researchers in buildings and thus evoking change through the direct involvement of teachers in planning as well as conducting research projects.

Perhaps of all of this suggests some research we might do on changing teacher behaviors. What I have actually given here, of course, is a set of

propositions derived from my own experience on how to get research results into action. I suggest that we need to know a great deal more about the communication process itself, about how to package information from the user's point of view. We might also find that some of the different methods I have suggested are especially useful in different kinds of situations. It has been shown in research on attitude change that small changes in areas of low intensity can be brought about by information alone. Information by itself becomes less efficacious, however, as the extent of desired change increases and as the intensity with which the attitude is already held increases. As the difficulty of the attitude change task grows, types of overt behaviors on the part of subjects become essential. A principle like this probably holds when we are concerned with change in teachers' behavior, and I suggest that this idea could be developed into a fruitful line of research.

I appreciate your attention very much and I would like to close my remarks by reiterating the point I made at the beginning. That is, that with the current state of educational practice, research results can affect change at the public school level only to the extent they change the behavior of the classroom teacher, and this is an area where we must put or focus.

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