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Abstract

The authors analyze some problems met in the attempt to implement an elementary science curriculum involving the use of Elementary Science Study units. The highly organized large scale effort at implementation seemed to have considerable impact at first, but it is now hard to identify lasting effects. The organization of workshops and use of television for inservice teacher education is described, and data are given on the numbers of teachers reached in different areas of the school system over a three year period. A number of reasons for the observed decline in response are suggested, many of them stemming from a loss of interest and commitment on the part of administrators as well as teachers. It is suggested that the initiation of any project from a central office presents problems, and that a central organization may make a more economical impact by providing support requested by schools or individuals. It is also argued that any effort at curriculum implementation requires careful evaluation as a basis for directing rational change. (EB)

The "Pygmalion Effect" in Science Curriculum Implementation

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The influence of expectation on results is a well documented phenomenon (Rosenthal 1968). The implementation of a new elementary science program in the public schools in Montgomery County, Maryland between 1964 and 1967 provides a large scale example of this effect. In retrospect, the early success of the program seems largely related to its novelty and expectation of administration that it would be implemented. The novelty of the program, in turn, required systems of teacher support on a scale which had never before existed. Now, two years after a highly organized large scale effort at implementation, it is very difficult to identify any lasting effects. Difficulties experienced in this effort have not been without profits as they have contributed to significant adaptations in philosophy of the system and its alteration.

The elementary science program consisted of twelve science units which were to be the first of many more related to a curriculum design. The design identifies the development of content through a K-6 program using behavioral statements of increasing complexity (Hoffmaster, Latham, Wilson 1964). The science units were new in that they emphasized science instruction as "inquiry" rather than the transmission of established content. In this paper, science will refer to this active exploration with materials. Although in workshops teachers were presented with necessary content background for working with the units, appropriate teaching strategies in teaching science as inquiry were presented by example and practice (Nicodemus 1967, 1969).

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The administrative arrangements for implementing the twelve units were extensive with the coordination of many departments within the Board of Education (Wilson, 1967). The beginning of most of these activities could be identified with the creation of the office of curriculum in 1959. Research was begun to describe characteristic behavior in classrooms, the Curriculum Study Committee recommended a separate science program, and a planned sequence of implementation outlined (MCPS 1964). The problem of introducing the units in a school system with over 2000 elementary teachers in over 100 schools was met by dividing the task into three parts, in which each year approximately a third of the teachers in an area worked with the units in a series of afterschool workshops.

At a pilot school, during the 1964-65 year, the problem of communicating a new program to teachers was studied. Teachers were given the guide and materials for the "Batteries and Bulbs" unit and asked to teach it with no additional help. A second group was given the guide and materials and encouraged to ask for consultant help whenever they wished. A third group, in addition to the above, was given a planned series of work sessions with the consultants in which they were given the same laboratory experiences that they were expected to give their children. After close observation of classes, evaluation of children's progress by interviews and simple written exercises, it became obvious that the most successful teacher support was with the third group.

During the first year of 1965-66, over six hundred teachers were to be introduced to the new science curriculum. Each teacher was supplied with classroom quantities of student materials, written guides and each attended from two to ten workshop sessions depending of the complexity of the particular unit that was being introduced. It was also found that morale was higher among the participants who had been given some released time to attend workshops than among those to who no released time had been given.

The first year also showed that the cost of student materials could be reduced considerably if, instead of purchasing prepackaged kits, each item was purchased in quantity and distributed to teachers.

The first year of workshops appeared to be very successful. Teacher attendance was very high. For example, the eight workshops for the 5th grade "Small Things" unit average 75% of the eligible teachers. Evidently, a greater percentage of teachers were contacted since some schools intentionally sent just one teacher from a grade level who would then work with the other teachers of the school system's three participating areas (out of a total of twelve administrative areas).There was a considerable variation in attendance. The average for the areas were A-78%, B-68%, and C-82%. Although there were evidently different factors influencing the degree of teacher participation, no attempt was made to account for them and make corrections in procedures.

The Department of Research conducted a telephone interview which reached 67% of the participating teachers. Sixty-two percent of the teachers said they would attend a similar workshop if offered again. Rated as most useful were demonstrations of using the materials and the opportunity to work with them with group discussion following. Ninety percent believed that the workshop was necessary for successful teaching of the units. Initial results of a study of classroom practices showed changes such as reduction of "whole-class" instruction (versus individual or small group work) from 71% to 45% of class time during science instruction.

During the school year 1966-67 the twelve units were introduced to 850 teachers in 4 additional areas. One of the primary units was presented via a televised workshop. The television presentation included some demonstrations of teaching techniques, pupil activities and materials. Teachers were urged to read the unit guide prior to the program and to bring a set of student materials to their TV viewing place so that they could do the unit activities as they were demonstrated. Follow-up work sessions in

schools to be lead by resource teachers or other teacher leaders were suggested. A special training session was conducted to prepare these leaders.

The Small Things workshops were reduced to four in number. Since the three areas in the first year of the study were the most enthusiastic for a science program, we might have expected a drop in teacher participation. For the Small Things unit, average attendance was 58% with considerable variation between areas; Area D 53%, Area E 44%, Area F 51%, and Area G 84%. The average of 58% was representative of the general drop in attendance for all twelve units. There was some relation between the distance traveled to the workshop and attendance.

The third year of workshops covered the remaining five areas with over 1,000 elementary teachers. The discouraging results were a function of a number of changes. The program by this time was "old" and competed with many others for teacher time. Some administrators seemed less committed to implementation of the program with the result that many problems previously solved became insurmountable. Workshops were conducted in one center instead of two making it more remote for many teachers although one of the closer areas had the worse attendance.

The use of eleven televised sessions, was designed to reach more teachers with the use of the same staff. This left sixty-three "live" workshops conducted by the staff. Comparison of attendance for the 5th grade "Small Things" workshops compared closely to attendance for all twelve units.

Area	Small Things	All Units
G	58	52
H	59	51
I	57	53
J	24	21
K	53	50
Average	51%	45%

Attendance from four new schools amounted to 11% of the estimated potential. With the considerable resources of people and materials that had been invested in implementing the science units, this was clearly a disappointing response. There were a number of problems that had clearly become insurmountable.

1. Teachers were supposedly released from their school by 2:15 to attend the workshop. This may or may not have been the case. Nevertheless, many tired teachers straggled in anywhere within an hour's time.
2. Many teachers perhaps did not receive or forgot the workshop schedule since it was sent out at the beginning of the year to principals. Where principals reminded teachers attendance was better. This probably happened more frequently when area directors reminded principals.
3. Participation in the TV programs broadcast over the local ETV station suffered from the above problem which was compounded by a random schedule fitting in where time was available. The only TV session watched by a significant number of teachers was the first one held in the planning week before classes and announced in the Superintendent's Bulletin. Of the few teachers viewing the remaining programs, many expressed a preference for the "live" workshops with the opportunity to ask questions and share experiences. Interestingly enough, this social dimension is an important feature of the science units used from Elementary Science Study (ESS).
4. Unlike the first two years in which teachers received unit guides at the workshop, in the third year the guides were all distributed at the beginning of the year. For some reason many teachers did not receive the guides.
5. In the third year science materials were not sent to individual schools' at the same time. This contributed to confusion as to their use and often the materials were stored and never used.

6. In the first two years teachers were encouraged to teach units at the same time of the workshops. In the last year, because of more arbitrary scheduling and problem of materials (e.g. microscopes for "Small Things" did not arrive until months after the workshops were completed) the workshops lost relevancey of accompanying the classroom.

After the workshops were completed there was seldom any call for follow-up help in the classrooms. Over the three years there was an increasing feeling of less ties to the schools, interest and committment of administration and teachers.

The decline of the effort in curriculum implementat the three years suggests that initiation of any project from a central office - objected to limitations. At any one time or for any particular subject the proportion of interested individuals is limited. A more economical impact may be made by a central organization by providing support requested by a school or individual. We are pleased to see Montgomery County moving in the direction of a support philosophy by changes in administrative organization and services available to teachers--e.g., workshops available in the analysis of teaching strategies and evaluation of teaching science as "inquiry". In Montgomery County there are many fine examples of science in elementary classes, but these instances are isolated--dependent more on the initiative of the individual teacher than any support of the system.

The prognosis for successful implementation of "inquiry" science is poor because of the difficulty of providing needed support--largely a function of limited funds. Support in the form of teacher workshops must be continual due to large staff turnover exceeding one-fifth of the staff in some metropolitan areas. The use of resource teachers must be carefully thought out. Many teachers are willing to have a demonstration teacher come into the classroom and "do science" but few have the energy, confidence or interest to cope with the demands of active exploration. The interested teacher willing to invest the time may solve many of the supply problems

at little cost but should we encourage this? Such work could be accomplished by aids or a central "science resource laboratory." Few systems have the funds to supply the commercial kits of new curriculum projects to all classrooms. Perhaps the greatest failure of national projects has been to make their materials available in an economical form or at least identify alternatives from readily available sources.

A complete analysis of any effort at curriculum implementation requires close study and documentation of the process as it occurs. Designation of what to look for and how to record it presupposes some concept of evaluation. If there was any "model of change" used in this curriculum effort, it failed at the point of assessment. For example, preliminary research indicated a change in classroom practices related to the science instruction. But the nature of the change and how it related to science was never established. Further data collected was never reported on at a time that it could have made any difference. What there was of any other evaluation is characterized by series of inferences which lead to questionable conclusions. Somehow there are never quite enough funds for an adequate evaluation - adequate in the sense of directing rational change.

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