DOCUMENT RESUME

ED 064 117 SE 013 814

AUTHOR Bybee, Rodger W.
TITLE The Ideal Elementary Science Teacher.
PUB DATE Apr 72
NOTE 14p.; Paper presented at the National Science Teachers Association Annual Meeting, New York City, April 1972

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Elementary School Science; *Science Teachers; Teacher Behavior; *Teacher Characteristics; Teacher Evaluation; *Teacher Rating

ABSTRACT

This study attempted to establish a hierarchy of characteristics for the elementary school science teacher based on the preference of elementary children, preservice teachers and in-service teachers. Teacher characteristics were classified into five categories: knowledge and organization of subject matter; adequacy of relations with students in science class; adequacy of plans and procedures in science class; enthusiasm in working with science students; and techniques of methods of teaching elementary science. The sample included 43 children from the fourth, fifth and sixth grades, 38 preservice teachers having no teaching experience, 20 preservice teachers with teaching experience, 43 in-service teachers in urban and suburban schools, and 33 in-service teachers in rural schools. The data were collected with a fifty-item Q-sort, with ten items for each of the five teacher characteristic categories. All groups, except one, ranked "adequacy of personal relations in science class" as the most important expectation of the ideal elementary school science teacher. "Enthusiasm in working with students in science" was ranked second. These first two items were reversed (the one exception) by in-service teachers in the urban schools. The students ranked "subject matter" as third, while all other groups placed "teaching method" third. (PR)

THE IDEAL ELEMENTARY SCIENCE TEACHER

RODGER W. BYBEE

T. T. T. PROJECT IN SCIENCE AND MATH

NEW YORK UNIVERSITY

National Science Teachers Association

20th Annual Convention - New York City

April 7-11, 1972

Rodger W. Bybee
New York University

The ideal elementary science teacher is an intriguing idea and one often thought of and discussed as elementary teachers and science educators form their instructional theory or design methods courses respectively. The endless arguments usually focus on the importance of method, curriculum subject matter, enthusiasm and understanding people. These discussions generally reflect the opinions, values, personal biases and prejudices of the individuals. Just as these people respond with their personal perceptions of what they feel or think is best, elementary students respond and behave in terms of their perceptions. Also, the perceived expectations these individuals have of other people are determiners of their behaviors. Based on these statements concerning perceptions it seemed reasonable to examine the hierarchy of perception concerning the elementary science teacher.

Through considering perceptions of the best or ideal elementary science teacher perhaps some conclusions can be reached relative to teacher-student interactions in the elementary science classroom; thus, at least in part, bridging the gap

between arguments centering on "what I think is best" and "what others think is best."

This study attempted to establish an order of preference or hierarchy concerning teacher characteristics that might be demonstrated by an elementary science teacher. It is not the purpose of this study to place value judgments of worth on the various characteristics. All teacher behaviors described are positive and certainly desirable. It was the purpose of this study to establish a profile of perceptions. The profiles were established by samples from three populations: elementary children, pre-service teachers and in-service teachers. The interaction of teaching has many elements, behaviors and characteristics, most of which can be classified into the categories used for this survey: (1) knowledge and organization of subject matter, (2) adequacy of relations with students in science class, (3) adequacy of plans and procedures in science class, (4) enthusiasm in working with science students and (5) techniques or methods of teaching elementary science.

POPULATIONS

The samples investigated included fourth, fifth and sixth grade children at the Laboratory School, University of Northern Colorado. The pre-service teachers were undergraduates, elementary education majors at the University of Northern Colorado. They were divided into two groups; those that had completed their student

teaching and those that had not completed their student teaching. Two groups of in-service teachers were included in the study. Geographic location is the primary distinction between these groups; one was located in an urban and/or suburban environment, the second was situated in a rural environment.

THE CHILDREN

Students from the Laboratory School of the University of Northern Colorado were used in the study. A total of forty-three children were sampled. Of these, eighteen were in either the fourth or fifth grade and twenty-five were sixth grade students. Intelligence scores demonstrated the children were slightly above average. They represented middle class homes. In general there were not outstanding characteristics of this sample relative to ethnic groups, cultural deprivation or geographic locations.

PRE-SERVICE TEACHERS - NO TEACHING EXPERIENCE

The first sample of elementary majors included thirty-eight individuals. Criteria for this group included no student teaching, observation, internship or experience as an aid or paraprofessional. These individuals had no extended experience in a teaching, or closely aligned, capacity.

There were thirty-six women and two men; the average age was twenty-one with a range from twenty to twenty-eight. The

majority, twenty-two, were juniors with fifteen seniors and one graduate student.

PRE-SERVICE TEACHERS - TEACHING EXPERIENCE

The second group of individuals were also elementary education majors at the University of Northern Colorado. The main variable considered in this selection was teaching experience. These people had had experience as student teachers or interns. They had not, in any case, taught for a full year. The majority had taught for ten weeks; a few were intern teaching for the complete year. The maximum they could have taught at the time of data collection was thirty weeks.

There were twenty people in this group; eighteen women and two men. The average age was twenty-four with a range from twenty-one to twenty-eight. Nineteen seniors and one graduate student made up this sample.

IN-SERVICE TEACHERS - URBAN AND SUBURBAN

The forty-three elementary teachers were from the greater Denver area and participated in an elementary science workshop during the Spring of 1971. There were forty women and three men; the average age was thirty-five with a range from twenty-two to fifty-six. They were all graduate students and presently teaching elementary school. The level at which they were teaching was distributed over the K-6 range. This sample had an average of six years experience and ranged from one to eighteen years of

experience.

IN-SERVICE TEACHERS - RURAL

The teachers in this sample representated eight schools in rural Colorado. These teachers participated in a science workshop early in the Summer of 1971. There were thirty-three teachers, all graduate students in this sample, twenty-nine women, and four men. The average age was forty-four with a range from twenty-four to sixty-five. They represented a fairly even distribution of all grade levels with two individuals from the secondary level. These teachers had an average of eleven years experience with a range from one to thirty-three years.

In general, the differences in age and years of experience characterize the difference between the urban and rural teachers. Because of location the rural teachers do not have as many opportunities for workshops, professional meetings and in-service classes sponsored by colleges and universities. Relative to educational issues, curriculum and teaching, it could also be added that the rural populations tend toward conservatism, while the urban teachers are more liberal.

PROCEDURES

The data for this study were collected during the Spring and Summer of 1971. The technique utilized to gather the data was a fifty item Q-sort.

The original forty items were identified by Cosgrove [1] and used in evaluating teacher performance. These items have been modified by Bybee and Chaloupka[2] for use in teacher effectiveness studies. This revision, by Bybee, is specifically for elementary science teaching. There are five major categories: Knowledge and Organization of Science Subject Matter, Adequacy of Relations with Students in Science Class, Adequacy of Plans and Procedures in Science Class, Enthusiasm in Working with Science Students, and Adequacy of Technique and Methods for Teaching Science. Each major category has ten items keyed to it specifically; these are the items sorted by the groups being investigated. Each item was prefaced with: THE IDEAL ELEMENTARY SCIENCE TEACHER.

I. Knowledge and Organization of Science Subject Matter

1. is well read in science
2. makes clear what is expected of students in science
3. is logical in his thinking
4. keeps science material up to date
5. is an "authority" in science
6. has a well organized science course
7. increases student's vocabulary in science by his own excellent usage
8. is well informed in the various related science fields
9. covers the subject well
10. has continuity in his science course

II. Adequacy of Relations with Students in Science Class

1. is pleasant in science class
2. gives everyone an equal chance
3. is friendly without making a great effort
4. never deliberately forces his own decisions on the science class
5. never criticizes in a destructive way
6. never makes students afraid of asking questions
7. accepts student's viewpoints with an open mind
8. does not ridicule wrong answers
9. encourages science students to think out answers
10. makes science relevant to the students

III. Adequacy of Plans and Procedures in Science Class

1. is always on time for class
2. does not fill up time with trivial material
3. always conducts an orderly science class
4. has well thought out procedures
5. is very fair in evaluation
6. spaces assignments evenly
7. always lets students know what is coming up in the next science class
8. always knows what he is doing
9. always has science material ready
10. always manages to get things done on time

V. Adequacy of Science Teaching Methods

1. encourages students to work independently on science projects
2. is skillful in asking questions so students can discuss science
3. has interesting science demonstrations
4. uses a variety of audio-visual materials
5. uses a problem-solving approach to science class
6. provides adequate opportunity for work with laboratory materials
7. has adequate reading materials for students
8. uses games and other simulation activities
9. uses a variety of teaching techniques
10. tries to individualize instruction

To reduce confusion the Q-sort was administered in two phases. The participant first went through the fifty items and divided them into three piles containing 17, 16, 17 items. The designations for the three groups were: positive, neutral and negative respectively. In the second step the items from the three categories were further separated into seven categories: most strongly agree (two items), strongly agree (six items), least strongly agree (twelve items), neutral (ten items), least strongly agree (twelve items), strongly disagree (six items), most strongly disagree (two items). The items were finally placed in envelopes with the category and allowable number

of items.

The items were then tallied and keyed back to the five major categories. Averages were obtained for each item; thus, a ranking was possible.

RESULTS

With one exception the groups ranked Adequacy of Personal Relations in Science Class as the item they perceived as the most important expectation of the ideal elementary science teacher. (See Table I). Second was Enthusiasm in Working with Students in Science. These items were reversed for the one exception, in-service teachers in the urban environment. The important point that emerges is the emphasis given direct personal interaction, be it adequate relations or enthusiasm, as opposed to the less personal aspects of teaching science, i.e., subject matter, planning and method.

The items ranked third had a rather interesting split. The children ranked subject matter as third, while all groups of teachers indicated teaching method was third. Subject matter was the fourth most important item to all teacher groups. The children were divided; for the sixth graders teaching method was fourth and adequate planning skills the least important of the five categories. Again there was unanimous agreement among teachers for the last category; it was adequacy of planning and procedure.

When all averages are combined a grand mean can be computed. (See Table II) When the grand mean is considered the two categories dealing with interpersonal relations again are the items perceived as being the most important. Methods, subject matter and planning were ranked third, fourth and fifth respectively.

TABLE I

RANKING OF TEACHING CATEGORIES BY GROUPS INVESTIGATED

GROUP	CATEGORY				
	Knowledge and Organization of Subject Matter	Adequacy of Relations with Students	Adequacy in Plans and Procedures	Enthusiasm in Working with Students	Teaching Method
6th Grade Students	3	1	5	2	4
4-5th Grade Students	3	1	4	2	5
Pre-Service Elem. Major No Teaching Experience	4	1	5	2	3
Pre-Service Elem. Major Teaching Experience	4	1	5	2	3
In-Service Urban/ Suburban	4	2	5	1	3
In-Service Rural	4	1	5	2	3

TABLE II

GRAND MEAN RANKING

RANK		CATEGORY	GRAND MEAN
1	II	Adequacy of Relations with Students in Science Class	3.346
2	IV	Enthusiasm in Working with Students In-Service	3.548
3	V	Adequacy of Science Teaching Methods	3.852
4	I	Knowledge and Organization of Science Subject Matter	4.550
5	III	Adequacy of Plans and Procedures in Science Class	4.731

DISCUSSION OF RESULTS

At the present time most pre-service programs at colleges and elementary science universities emphasize knowledge of subject matter, ability to prepare and appropriate methods and curriculum materials. It seems obvious elementary science teachers should achieve and maintain a competent level of subject matter, be well planned and have access to and utilize various methods of instruction. This question is not the object of this discussion. The following implications should not be viewed in an either/or, context. The basic implication is a plea for inclusion of the complex behaviors related to interpersonal relationships. This has historically received minor emphasis in the elementary science programs of future and in-service teachers; yet, their importance is without question.

As elementary science teachers enter the classroom they enter with a set of values and attitudes initially developed through involvement in a teacher education program. At the same time children enter classrooms with their perceptions, attitudes and ideas about teachers. Often these two value systems conflict. It is ironic that, as this survey indicated, all groups of individuals have the same basic perceptions about the ideal teacher. It seems teacher preparation programs, with their emphasis on cognition, planning and method, produce a gap of incongruence between teachers beliefs and their classroom behavior.

The goal of elementary science education is to produce the best teacher possible. The conflict outlined above should be confronted by science educators and attempts made to reduce the existing imbalance. If interpersonal relations are as important as all groups questioned indicate they are, there should be a recognition of this fact in training programs for elementary science teachers. If we fail to accept these aspects as important, we are not doing our best for the elementary science teachers; more importantly we could be doing more for the children.

REFERENCES

(1) Cosgrove, Don J., "Diagnostic Rating of Teacher Performance," Journal of Education Psychology, Volume 50, Number 5, 1959, pp. 200-204.

(2) Bybee, Rodger W. and Chaloupka, Donald W., "Students Perceptions of the Teacher They Like Best - A Comparison Including Advantaged - Average and Disadvantaged Students," Colorado Journal of Educational Research, Volume 10, Number 4, Summer, 1971, pp. 31-35.