

SECTION E, SCIENCE EDUCATION

Science Teacher Reactions to New Science Curricula

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The past decade has witnessed the advent of several new curriculum programs in science and mathematics. The appearance of new curricular materials in the secondary school sciences is, in part, a result of an increased interest on the part of educators and scientists. Their interest stems from a desire for a secondary school science curriculum that is both interesting and consistent with current scientific knowledge.

The teaching techniques suggested in these new curricular materials are in some cases quite different from the conventional approach to teaching science courses. Since little information was available concerning the science teachers' reaction to these new curriculum programs a study (Blankenship, 1965) was conducted to determine the science teachers' attitude toward a curriculum program (the Biological Science Curriculum Program, hereinafter referred to as BSCS Biology) that calls for modification of, and in some instances, radical changes in, the teaching techniques used by science teachers.

Four different methods were used to determine the science teachers' attitudes (Blankenship, 1966). The data used in determining the teachers' attitudes to the BSCS Program were all obtained following a summer institute training period in which 55 teachers were given the opportunity to become thoroughly acquainted with the content, philosophy, and methods of the BSCS Biology Program.

The problem—This study was designed to permit investigation of the reactions of a selected group of science teachers to the BSCS Biology Program.

Procedure—The science teachers' reactions to BSCS Biology were evaluated in this study through the use of four different measures: an Attitude Inventory, a Peer Rating (Webb, 1956), an Instructors' rating, and a Follow-up Questionnaire designed to ascertain use, lack of use, and anticipated use of the BSCS Program.

The three conditions desirable for the study were: (1) a sufficiently large sample of science teachers; (2) a period of intensive training for these science teachers so that they might have the opportunity to become thoroughly familiar with the content, methods, and philosophy of the BSCS Biology Program; and (3) a data-gathering period immediately following this training period. These conditions were met in an NSF-sponsored BSCS Summer Institute Program.

The science teacher sample was classified into three categories based upon their composite ratings on the four attitude measures. The three categories were: (1) those science teachers who had clearly demonstrated a favorable attitude toward the BSCS Biology Program; (2) those science teachers who had clearly demonstrated an unfavorable attitude toward the BSCS Biology Program; and (3) those science teachers who had not clearly demonstrated either of the above-mentioned attitudes.

The science teachers who satisfied one of the following three criteria were placed in the category of possessing a favorable attitude: (1) a score in the top quarter of the Attitude Inventory; (2) a rating in the top quarter of the Peer Rating; and (3) the indication that the science teacher was currently teaching BSCS Biology, expressed satisfaction with the Program, and anticipated its continued use. In addition to satisfying at least one of the above three criteria the teacher must not have been given an unfavorable rating by the instructors. The teacher was classified as possessing an unfavorable attitude if he scored in the bottom quarter on either the Attitude Inventory or the Peer Rating; (2) received an "unfavorable attitude" rating from the instructor; or (3) indicated on the Follow-up Questionnaire that he was not teaching BSCS Biology, did not anticipate teaching the Program, and did not prefer to teach the program even if conditions were such that he would be permitted to do so. Teachers not falling in

either the "favorable attitude" or the "unfavorable attitude" categories were placed in an "indeterminate attitude" category.

The above-listed criteria for classification of the sample into a favorable-attitude group and an unfavorable-attitude group resulted in 25 science teachers being classified as possessing favorable attitudes and 24 science teachers being classified as possessing unfavorable attitudes. Six subjects were placed in an indeterminate-attitude category.

Findings—Table I shows the number of teachers, and percentage of the science teacher sample, who taught BSCS Biology in the school year following their summer training program. A total of 27 of the 55-member sample, or 49%, taught the Program. The Table also contains data indicating the number of science teachers who were planning to teach the Program during future school years; 44, or 80%, of the sample indicated intentions to teach BSCS Biology. Since this figure includes those who taught the Program the preceding year, this represented a net increase of 17 teachers. Two of the teachers who taught BSCS Biology the first year indicated that they would not teach it in the future!

Table II shows data obtained in a second-year follow-up study. In comparing Table I with Table II it should be noted that only 38 of the science teachers (not the 44 who indicated in Table I that they would teach BSCS in 1964-65) actually taught the course during 1964-65. Also, it should be noted that only 35 science teachers plan to teach BSCS Biology during the 1965-66 school year. Of the 24 teachers who were initially identified as being unfavorable toward the Program, only 12, or 50%, are actually planning to teach the Program during the 1965-66 school year while 21 of the 25, or 84%, identified as possessing favorable attitudes toward the Program are planning to teach the Program.

Table III and Table IV contain data relating to the reasons given for not teaching BSCS Biology. It is recognized that these reasons may not be the actual ones for not using the Program; however, these were reported.

Table V contains the report of the science teachers' responses to four statements regarding their reactions toward BSCS Biology.

CONCLUSIONS AND SUMMARY

The purpose of this study was to investigate the reactions of science teachers to a new science program (BSCS Biology). The science teacher sample consisted of 55 teachers who studied the BSCS Program in a summer training program. Based upon analysis of four separate measures used in determining the teachers' reactions to the Program, the science teachers were classified as reacting favorably or unfavorably to the BSCS Biology Program.

Tables I through V summarize the data gathered in the study. The second Follow-up Questionnaire was mailed to the science teachers approximately 20 months after their summer training program. It appears from a review of the data that, after the 20 months, those science teachers who indeed favored the BSCS approach to teaching high school biology were teaching the Program. Also, those science teachers who did not favor the Program were teaching conventional biology, or perhaps, teaching BSCS content using conventional methods.

The significance of this study lies in the facts that (1) it demonstrates that teachers' attitudes toward the new science curricula can be rather accurately measured; and (2) a mere counting of teachers currently teaching a particular science program does not indicate the number of science teachers who agree with the philosophy, content, and methods advocated by that particular program.

Since the various curriculum studies have much in common, i.e., emphasis on laboratory work and student participation, it would be interesting to see if findings from similar research in these other curricula studied would parallel the findings of this study.

TABLE I. 1963-1964 FOLLOW-UP RESULTS OF NUMBERS OF TEACHERS INVOLVED IN TEACHING BSCS BIOLOGY

	FA Group	UA Group	Indeterminate Group	Total	Percentage
Number teaching BSCS	16	11	0	27	49
Number not teaching BSCS	9	13	6	28	51
Number planning to teach BSCS 1964-1965*	25	16	3	44	80

Total, N = 55; Favorable-attitude group, N = 25; Unfavorable-attitude group, N = 24; Indeterminate group, N = 6

*This includes those currently teaching BSCS Biology who plan to continue teaching the Program.

TABLE II. 1964-1965 FOLLOW-UP RESULTS OF NUMBERS OF TEACHERS INVOLVED IN TEACHING BSCS BIOLOGY

	FA Group	UA Group	Indeterminate Group	Total	Percentage
Number Teaching BSCS	20	16	2	38	69.1
Number Not Teaching BSCS	5	8	4	17	30.9
Number Planning to Teach BSCS 1965-1966*	21	12	2	35	63.6

TOTAL, N = 55; FA group, N = 25; UA group, N = 24; Indeterminate group, N = 6

*This includes those currently teaching BSCS Biology who plan to continue teaching the Program.

TABLE III. REASONS GIVEN FOR NOT TEACHING BSCS BIOLOGY 1963-1964 SCHOOL YEAR

REASONS	FA GROUP	UA GROUP	INDETERMINATE GROUP	TOTAL
1. Think conventional course better than BSCS	0	0	0	0
2. Do not think BSCS Program fulfills local needs	0	0	0	0
3. Textbooks and related materials not available	4	5	2	11
4. Adequate laboratory space not available	3	7	2	12
5. Adequate equipment and supplies not available	5	9	4	18
6. Feel personal preparation and training inadequate	0	4	2	6
7. Excessive additional work required of teacher	0	2	0	2
8. Local school administration does not favor use of Program	1	2	0	3
9. Fellow biology teachers do not favor use of Program	0	1	0	1
10. Not currently teaching biology in senior high school	1	1	0	2
11. Lack of funds to buy equipment and supplies	2	2	1	5
12. Other reasons	0	1	2	3

TABLE IV. REASONS GIVEN FOR NOT TEACHING BSCS BIOLOGY 1964-1965 SCHOOL YEAR

REASONS	FA GROUP	UA GROUP	INDETERMINATE GROUP	TOTAL
1. Think conventional course better than BSCS	0	0	0	0
2. Do not think BSCS Program fulfills local needs	1	1	0	2
3. Textbooks and related materials not available	1	1	0	2
4. Adequate laboratory space not available	3	3	3	9
5. Adequate equipment and supplies not available	3	3	2	8
6. Feel personal preparation and training inadequate	0	0	0	0
7. Excessive additional work required of teacher	1	1	1	3
8. Local school administration does not favor use of Program	0	3	0	3
9. Fellow biology teachers do not favor use of program	1	1	0	2
10. Not currently teaching biology in senior high school	0	1	1	2
11. Lack of funds to buy equipment and supplies	0	0	2	2
12. Other reasons	0	0	0	0

TABLE V. REACTIONS OF SCIENCE TEACHERS TO FOUR STATEMENTS CONCERNING BSCS BIOLOGY

Reaction Statements	1963-1964	1964-65
1. I am currently teaching BSCS Biology and I prefer to continue teaching it.	24	33
2. I am currently teaching BSCS Biology but I do not prefer it and would rather teach the conventional course.	3	3
3. I am not currently teaching BSCS Biology but I prefer the Program and I would teach it if the situation permitted it.	27	12
4. I am not currently teaching BSCS Biology and I do not prefer to teach BSCS Biology.	1	2
No response on this part of Questionnaire.	0	5

LITERATURE CITED

- Blankenship, Jacob W. 1965. Biology teachers and their attitudes concerning BSCS. *J. Res. Sci. Teach.* 3:54-60.
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