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PERCEPTIONS OF SCIENCE OF THIRD, SEVENTH, AND ELEVENTH GRADE STUDENTS ENROLLED IN CEDAR RAPIDS (IOWA) SCHOOLS

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As a part of the Third Assessment of Science for the National Assessment of Educational Progress (National Assessment, Note 1.), an extensive battery of items dealing with the affective domain were included for the first time. Information for the National Assessment of Educational Progress is gathered from a stratified sample drawn from the entire United States. All questions are reviewed by education specialists (including science educators, measurement experts, and lay persons). The questions are administered to 2,500 persons selected to represent varying age levels. For NAEP studies, four samples are used, namely 9, 13 and 17-year-olds and a young-adult sample.

In Iowa Yager and Bonnstetter (1983) conducted a statewide follow-up of the NAEP affective items in 1982-83. They found only fourteen items in the 1977 national study used with each of the age-level samples. These fourteen items, which were also selected for use by Yager and Bonnstetter, were:

- 1) Does studying science make you feel happy?
- 2) Do you find your study of science interesting?
- 3) Does studying science make you feel stupid?
- 4) Does science make you feel excited?
- 5) Does science make you feel successful?
- 6) Does your science teacher ask you questions about science?
- 7) Does your science teacher like for you to ask questions about science?
- 8) Does your science teacher ever let you give your own ideas?
- 9) Does your teacher really like science?
- 10) Does your teacher make studying science exciting?
- 11) Does your teacher know a lot about science?
- 12) Are the things you learn in science useful to you when you are *not* in school?
- 13) Do you think that knowing a lot about science will help you in the future?
- 14) Would you like being a scientist?

Six additional items used in the 1977 NAEP battery for 13 and 17-year-olds were adopted for use in the Cedar Rapids study. These items deal with student perceptions of what it is like to be a scientist:

- 1) Do you think that being a scientist would be fun?
- 2) Do you think that being a scientist would make you rich?
- 3) Do you think that being a scientist would be a lot of work?
- 4) Do you think that being a scientist would be boring for you?
- 5) Do you think that being a scientist would make you feel important?
- 6) Do you think that being a scientist would make you lonely?

The questionnaire was administered by homeroom teachers during a one week interval in April 1983. The time required was less than 15 minutes at each level and for each student. In the case of third-grade students, teachers were asked to orally re-state any questions that seemed to offer reading and/or interpretation problems. This procedure was similar to that used as a part of the NAEP.

The results of the 20-item questionnaire for the 450 students were hand tabulated by the investigators. The results for this report were divided into four categories. These included student:

- 1) views of science teachers,
- 2) views of science classes,
- 3) views concerning usefulness of science study,
- 4) views of what it is like to be a scientist.

These four categories were used to formulate Tables 1, 2, 3, and 4.

Table 1 displays the information (recorded in terms of percentages) regarding student perceptions of their science teachers across the nine grade span involved with the study. For analysis in this report, only positive responses are considered. This permits ready comparisons with other follow-up studies (Harms, *et al.*, 1979; Hueftle, *et al.*, 1983; Yager, 1981, 1982, 1983; Yager and Bonnsetter, 1983).

Table 1 indicates that science teachers are perceived by students to ask many questions. The elementary teachers are almost universally viewed as question askers. However only 77 percent and 72 percent of the science teachers of seventh and eleventh grade students are perceived as "question askers." Two-thirds of the third and seventh grade students report that their teachers appreciate their questions. This jumps to a figure over 80 percent for students at the eleventh grade level. Students rate their science teachers very positively for allowing them to express their ideas at all three grade levels. When asked whether their teachers "really like" science, just over a third of the elementary and the junior high students respond affirmatively. However, the figure doubles at the eleventh grade level. Elementary teachers are perceived as making the study of science exciting — twice as often as in the junior high and much more frequently than in the eleventh grade. Teachers at all three grade levels are perceived as "knowing a great deal" about science. Two-thirds of the students so describe their teachers. Elementary teachers are said to admit often to not knowing answers about science — about twice as often as teachers at the other

two levels. The longer students remain in school and the more advanced their class, the less likely they are to report that their science teachers admit to not knowing.

Table 1
Students' Perceptions Concerning Their Science Teachers

Description of Teachers	Percent Responding								
	Third Grade			Seventh Grade			Eleventh Grade		
	Yes	No	Don't Know	Yes	No	Don't Know	Yes	No	Don't Know
Ask questions about science	90	05	05	77	10	12	72	13	13
Like you to ask questions in science	62	08	30	67	02	31	84	03	13
Let you give your ideas	80	08	12	72	15	12	73	08	15
Really like science	35	00	66	37	06	57	71	03	25
Make science exciting	59	26	15	30	60	10	45	40	15
Know a great deal about science	67	05	28	57	12	30	74	05	21
Admit to not knowing	43	33	24	23	47	30	19	58	23

Table 2 is a report of student perceptions about their science classes. The study of science is perceived as fun by nearly half of the third grade students; this drops to 12 percent for seventh graders, then increases to 21 percent for eleventh graders. Similarly, elementary students report finding their study of science more interesting than do seventh and eleventh graders. Science is also perceived as being exciting to third graders, but is so described by only 10 percent of the seventh graders and 16 percent of the eleventh graders. Students report that science classes usually do not make them feel uncomfortable. However, there is a slight increase in the percentage of students with such perceptions as the sample grows older. Science classes frequently make elementary school students feel successful (59 percent so report). This number drops to just over a third of the students at both the seventh and eleventh grade levels.

Table 2
Students' Perceptions of Their Science Classes

Description of Classes	Percent Responding								
	Third Grade			Seventh Grade			Eleventh Grade		
	Yes	No	Don't Know	Yes	No	Don't Know	Yes	No	Don't Know
Are fun	45	22	34	12	60	28	21	53	25
Are interesting	74	18	08	56	30	14	59	29	12
Are exciting	39	37	25	10	75	14	16	65	18
Make me feel									
a) Uncomfortable	09	81	10	14	77	08	24	63	13
b) Successful	59	13	28	35	36	29	35	44	21

Table 3 indicates students' perceptions of the usefulness of their science study now and in the future. It is apparent that most students in third and eleventh grade feel their science study is important to them in terms of daily living. For some reason, the number with such a perception decreases to 39 percent among seventh grade students. The elementary school students are more convinced that their science studies *will be* useful; 84 percent of the third graders indicate that to be true. The figures for seventh and eleventh grade students expecting future value from science study do not vary from their numbers describing it to be of current value.

Table 3
Students' Perceptions of Usefulness of
Their Study of Science in School

Grade Level	Percent Responding		
	Yes	No	Don't Know
A. Useful Now in Daily Living			
Third	62	20	18
Seventh	39	23	38
Eleventh	57	22	19
B. Useful in the Future			
Third	84	04	11
Seventh	39	23	38
Eleventh	53	22	25

Table 4 indicates students' perceptions of what it would be like to be a scientist. Only 20 percent of the third graders feel that it would be fun. This perception increases to 44 percent for seventh graders but drops again to 16 percent for eleventh grades. Only 14 percent of third and eleventh grade students report the opinion that being a scientist would make one rich. The number with such a perception increases significantly — to 38 percent — for seventh graders. Generally a fourth of the third and seventh graders perceive that being a scientist would be too much work. This increases to 38 percent of the eleventh grade sample. A total of 43, 29, and 47 percent of third, seventh, and eleventh grade students respectively report that they would find being a scientist boring. It is interesting to speculate why differences occur between the percentages for third and eleventh graders where nearly one-half report science study to be boring, and the seventh graders where the number with that view falls below one-third. About a third of the third and eleventh grade sample report that being a scientist would make them feel important. This figure jumps to 55 percent for seventh graders. Again, the uniqueness of the perception of seventh graders is apparent. Relatively few students at any grade level feel that being a scientist would be a lonely career.

Table 4
Students' Perceptions of What It
Would Be Like Being a Scientist

Characteristic	Percent Responding								
	Third Grade			Seventh Grade			Eleventh Grade		
	Yes	No	Don't Know	Yes	No	Don't Know	Yes	No	Don't Know
Be fun	20	60	20	44	36	20	16	61	23
Make you rich	14	26	59	38	13	49	14	36	49
Be too much work	25	40	35	26	44	30	38	29	32
Be boring	43	30	27	29	53	18	47	29	23
Make you important	32	23	45	55	17	28	36	34	30
Be lonely	14	37	50	12	61	27	16	33	50

This study was the first conducted within a single school district with a random selection of students across grade levels. The NAEP results were obtained from large numbers of students randomly selected from schools across the entire United States. The findings were frequently analyzed to compare various geographical areas. One strength of the Cedar Rapids report is the control that one district provides in terms of the possible influence of local problems, the science curriculum, and the philosophy of teachers upon the students' perceptions.

The autumn 1983 *Iowa Science Teachers Journal* reported a similar follow-up study using 14 of the same questions conducted in sample classes in five regional centers in Iowa during 1982 (Yáger and Bonnstetter, 1983). Interesting differences and similarities emerge when the Cedar Rapids results are compared to those reported for that 1982 Iowa follow-up study and the original 1977 NAEP national assessment.

Teachers might also find it interesting to collect information in their own classes and district for comparison. The items included in this report could be used directly in a questionnaire to determine perceptions of students about teachers, science classes, the usefulness of science study, and what it is like to be a scientist. Repeat studies could be conducted using this instrument to determine the effectiveness of innovations designed to improve science teaching and resultant student perceptions.

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Reference Note

1. National Assessment of Educational Progress. *Science: Second Assessment (1972-73): Changes in science performance 1969-73, with exercise volume and appendix* (April, 1977): 04-S-21, *Science technical report: Summary Volume* (May, 1977). *Science: Third assessment (1976-77): 08-S-04, Three national assessments of science: Changes in Achievement, 1969-77*, (June, 1978); 08-S-08, *The third assessment of science, 1976-77*. Released exercise set (May, 1978). Also some unpublished data from the 1976-77 science assessment. 1860 Lincoln St., Denver, CO.