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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 Bonnstetter, 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 (Yager 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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