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SURVEY OF IN-SERVICE NEEDS OF IOWA SCIENCE TEACHERS

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National concerns about science education have suggested a number of factors which are contributing to what is now being called a crisis. One such factor is that colleges and universities are producing fewer certified science teachers, even as many science teachers are leaving the classroom to pursue other employment. A second factor is that the average age of the science teacher is increasing and many teachers have not continued to update their training. A third factor, which may be a result of the first two, is that the number of secondary students taking science and the number of courses they are taking is on the decline.

These factors strongly indicate the need for an in-service program for science teachers. In an effort to determine if such a need is perceived by the science teachers and science supervisors of Iowa, an extensive survey was conducted. The survey was designed to gather information on perceived needs of in-service content, method of delivery, instructional setting and budgetary arrangements. Using Iowa Department of Public Instruction 1982-1983 records, a random sample of 250 middle school, junior high school and senior high school science teachers was chosen. One hundred and sixty-six (166) teachers responded to the survey which was mailed to them during the spring of 1983. The survey was also sent to 90 members of the Iowa Council of Science Supervisors and 45 responses were received.

The questions from the survey instrument and the relative frequency percentages of responses for both teachers and supervisors is presented in Table 1. Demographic data for survey responders is given in Table 2.

Based on an analysis of data from the survey, the following conclusions have been drawn concerning in-service science education needs:

- (1) Coursework should stress the interaction of science and society as well as basic information and the latest developments in science.
- (2) Coursework should be tailored to teacher needs and delivered in rather non-traditional, but centralized settings such as Area Education Agency facilities.
- (3) Discovery and activity aspects of science should be a part of inservice education.
- (4) The use of television for educational in-servicing does not appear to be received well by science teachers.
- (5) Science teachers and supervisors feel strongly that shared funding arrangements should be developed.

Table 1
Survey Questions and Responses

I believe the following type of coursework for present teachers of science would increase teaching effectiveness in the middle school/junior high school:

| Teacher Responses | | | | | | | Supervisor Responses | | | | | |
|-------------------|------|------|-----|-----|-----|--------------------------------------------------------------------------------|----------------------|------|------|------|-----|-----|
| SA | A | U | D | SD | DM* | | SA | A | U | D | SD | DM* |
| 22.9 | 45.2 | 19.3 | 7.8 | 0.6 | 4.2 | 1. Courses that emphasize the latest developments in teaching methodology | 40.9 | 36.4 | 11.4 | 0.0 | 6.8 | 4.5 |
| 34.9 | 50.6 | 7.2 | 5.4 | 0.6 | 1.2 | 2. Courses that emphasize the basic content of the physical sciences | 36.4 | 36.4 | 11.4 | 6.8 | 4.5 | 4.5 |
| 38.0 | 49.4 | 6.0 | 4.8 | 0.6 | 1.2 | 3. Courses that emphasize the basic content of the life sciences | 34.1 | 38.7 | 11.4 | 11.4 | 2.3 | 2.3 |
| 32.5 | 48.2 | 12.0 | 5.4 | 0.6 | 1.2 | 4. Courses that emphasize the basic content of the earth sciences | 31.8 | 45.5 | 11.4 | 6.8 | 2.3 | 2.3 |
| 19.9 | 59.0 | 13.3 | 6.6 | 0.0 | 1.2 | 5. Courses that emphasize the latest development in the physical sciences | 20.5 | 59.1 | 6.8 | 6.8 | 2.3 | 4.5 |
| 25.3 | 56.6 | 11.4 | 5.4 | 0.0 | 1.2 | 6. Courses that emphasize the latest developments in the life sciences | 20.5 | 61.4 | 4.5 | 11.4 | 0.0 | 2.3 |
| 22.9 | 52.4 | 15.7 | 7.2 | 0.0 | 1.8 | 7. Courses that emphasize the latest developments in the earth sciences | 22.7 | 63.6 | 4.5 | 6.8 | 0.0 | 2.3 |
| 43.4 | 38.0 | 13.3 | 4.2 | 0.0 | 1.2 | 8. Courses that emphasize the interaction of science, technology and society | 63.6 | 34.1 | 0.0 | 0.0 | 0.0 | 2.3 |
| 34.4 | 41.6 | 18.7 | 4.2 | 0.0 | 1.2 | 9. Courses that emphasize the inter-disciplinary relationships of the sciences | 63.6 | 29.5 | 2.3 | 2.3 | 0.0 | 2.3 |

*Responses given in percent of relative frequency

SA - strongly agree, A - agree, U - undecided, D - disagree, SD - strongly disagree, DM - data missing

Table 1 continued

I believe the following type of coursework for present teachers of science would increase teaching effectiveness in the senior high school:

| Teacher Responses | | | | | | | Supervisor Responses | | | | | |
|-------------------|------|------|-----|-----|-----|--------------------------------------------------------------------------------|----------------------|------|------|-----|-----|-----|
| SA | A | U | D | SD | DM* | | SA | A | U | D | SD | DM* |
| 25.9 | 44.0 | 15.7 | 7.8 | 1.2 | 5.4 | 1. Courses that emphasize the latest developments in teaching methodology | 43.2 | 34.1 | 9.1 | 4.5 | 4.5 | 4.5 |
| 25.9 | 55.4 | 8.4 | 5.4 | 0.6 | 4.2 | 2. Courses that emphasize the basic content of the physical sciences | 34.1 | 36.4 | 13.6 | 6.8 | 4.5 | 4.5 |
| 30.1 | 51.2 | 8.4 | 5.4 | 0.6 | 4.2 | 3. Courses that emphasize the basic content of the life sciences | 29.5 | 34.1 | 18.2 | 9.1 | 4.5 | 4.5 |
| 23.5 | 51.8 | 14.5 | 5.4 | 0.6 | 4.2 | 4. Courses that emphasize the basic content of the earth sciences | 29.5 | 36.4 | 18.2 | 6.8 | 4.5 | 4.5 |
| 28.9 | 58.4 | 6.0 | 3.6 | 0.0 | 3.0 | 5. Courses that emphasize the latest development in the physical sciences | 25.0 | 61.4 | 4.5 | 4.5 | 0.0 | 4.5 |
| 34.9 | 51.8 | 6.6 | 3.0 | 0.6 | 3.0 | 6. Courses that emphasize the latest developments in the life sciences | 27.3 | 52.3 | 9.1 | 6.8 | 0.0 | 4.5 |
| 28.3 | 52.4 | 12.0 | 3.6 | 0.6 | 3.0 | 7. Courses that emphasize the latest developments in the earth sciences | 25.0 | 59.1 | 6.8 | 4.5 | 0.0 | 4.5 |
| 51.2 | 32.5 | 9.6 | 2.4 | 0.6 | 3.6 | 8. Courses that emphasize the interaction of science, technology and society | 75.0 | 25.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42.8 | 36.7 | 13.9 | 2.4 | 0.0 | 4.2 | 9. Courses that emphasize the inter-disciplinary relationships of the sciences | 65.9 | 31.8 | 0.0 | 2.3 | 0.0 | 0.0 |

*Responses given in percent of relative frequency

SA - strongly agree, A - agree, U - undecided, D - disagree, SD - strongly disagree, DM - data missing

Table 1 continued

I believe the following are the best ways to provide science teachers additional training and education:

| Teacher Responses | | | | | | Supervisor Responses | | | | | | |
|-------------------|------|------|------|------|-----|---------------------------------------------------------------------------------------------------------|------|------|------|------|------|-----|
| SA | A | U | D | SD | DM* | | SA | A | U | D | SD | DM* |
| 22.3 | 34.3 | 12.5 | 22.9 | 3.6 | 2.4 | 1. Weekend workshops or seminars during the academic year | 34.1 | 31.8 | 22.7 | 4.5 | 2.3 | 4.5 |
| 9.6 | 33.7 | 23.5 | 25.9 | 4.2 | 3.0 | 2. Regular full-semester evening classes | 20.5 | 15.9 | 31.8 | 13.6 | 11.4 | 6.8 |
| 20.5 | 41.0 | 19.9 | 11.4 | 3.6 | 3.6 | 3. Evening short courses (1 credit hour) during the academic year | 25.0 | 27.3 | 27.3 | 11.4 | 2.3 | 6.8 |
| 48.2 | 32.5 | 8.4 | 5.4 | 1.8 | 3.6 | 4. Summer short courses of one week average duration | 43.2 | 45.5 | 9.1 | 0.0 | 0.0 | 2.3 |
| 16.3 | 50.6 | 18.1 | 10.2 | 1.8 | 3.0 | 5. Regular summer school courses | 31.8 | 36.4 | 18.2 | 6.8 | 2.3 | 4.5 |
| 14.5 | 33.7 | 22.3 | 21.7 | 3.6 | 4.2 | 6. A combination of summer short courses with evening or weekend follow-up during the academic year | 47.7 | 27.3 | 15.9 | 4.5 | 0.0 | 4.5 |
| 28.9 | 31.3 | 15.7 | 16.9 | 5.4 | 1.8 | 7. In-service programs during school district in-service days | 13.6 | 36.4 | 9.9 | 22.7 | 11.4 | 6.8 |
| 7.8 | 34.9 | 31.3 | 18.7 | 3.0 | 4.2 | 8. Courses taught on campus at a college or university | 13.6 | 36.4 | 25.0 | 18.2 | 2.3 | 4.5 |
| 30.1 | 47.0 | 16.3 | 3.0 | 0.0 | 3.6 | 9. Courses taught by college faculty in centralized locations, such as Area Education Agency facilities | 34.1 | 50.0 | 11.4 | 0.0 | 0.0 | 4.5 |
| 7.2 | 24.7 | 27.1 | 26.5 | 11.4 | 3.0 | 10. Courses taught over television or other video media | 6.8 | 22.7 | 27.3 | 22.7 | 15.9 | 4.5 |
| 9.0 | 29.5 | 28.9 | 21.7 | 8.4 | 2.4 | 11. A combination of TV/video and live classes | 13.6 | 31.8 | 31.8 | 15.9 | 2.3 | 4.5 |

*Responses given in percent of relative frequency

SA - strongly agree, A - agree, U - undecided, D - disagree, SD - strongly disagree, DM - data missing

Table 1 continued

I believe coursework to update science teachers should be delivered in the following instructional setting:

Teacher Responses

Supervisor Responses

| SA | A | U | D | SD | DM* | | SA | A | U | D | SD | DM* |
|------|------|------|------|------|-----|-----------------------------------------------------------------------------------------------|------|------|------|------|------|-----|
| 4.2 | 16.3 | 19.3 | 38.0 | 19.3 | 3.0 | 1. Classroom lecture/discussion without laboratory or field experiences | 2.3 | 6.8 | 11.4 | 29.5 | 47.7 | 2.3 |
| 31.3 | 56.6 | 7.8 | 1.2 | 0.0 | 3.0 | 2. A combination of classroom lecture/discussion with verification type laboratory activities | 31.8 | 38.6 | 11.4 | 18.2 | 0.0 | 0.0 |
| 44.0 | 42.8 | 8.4 | 1.2 | 0.0 | 3.6 | 3. Lecture and field work (for earth science and biology) | 31.8 | 45.5 | 15.9 | 4.5 | 0.0 | 2.3 |
| 21.1 | 41.6 | 21.7 | 11.4 | 0.6 | 3.6 | 4. Using inquiry and/or discovery-based activities with follow-up lecture/discussion | 36.4 | 36.4 | 15.9 | 6.8 | 0.0 | 4.5 |
| 54.8 | 33.7 | 5.4 | 1.8 | 0.0 | 4.2 | 5. Courses should be tailored towards the needs and teaching levels of teachers. | 54.5 | 36.4 | 9.1 | 0.0 | 0.0 | 0.0 |

*Responses given in percent of relative frequency

SA - strongly agree, A - agree, U - undecided, D - disagree, SD - strongly disagree, DM - data missing

Table 1 continued

I believe the following budgetary arrangements are the best ways to provide additional training and education for science teachers:

| Teacher Responses | | | | | | | | Supervisor Responses | | | | | |
|-------------------|------|------|------|------|-----|----------------------------------------------------------------------------------------------------------------------------------|------|----------------------|------|------|------|-----|--|
| SA | A | U | D | SD | DM* | | SA | A | U | D | SD | DM* | |
| 1.8 | 3.0 | 19.3 | 34.9 | 36.1 | 4.8 | 1. Science teachers should pay all expenses for course work | 4.5 | 4.5 | 13.6 | 40.9 | 31.8 | 4.5 | |
| 4.8 | 42.8 | 25.9 | 13.3 | 7.2 | 6.0 | 2. Teachers should share in the expenses involved | 18.2 | 50.0 | 18.2 | 6.8 | 4.5 | 2.3 | |
| 9.0 | 39.8 | 19.3 | 16.9 | 8.4 | 6.6 | 3. Expenses should be shared by teacher and school district | 6.8 | 36.4 | 27.3 | 15.9 | 11.4 | 2.3 | |
| 16.9 | 39.2 | 22.3 | 12.0 | 4.8 | 4.8 | 4. Expenses should be shared by school district and state government | 11.4 | 43.2 | 20.5 | 15.9 | 4.5 | 4.5 | |
| 27.7 | 37.3 | 18.7 | 6.6 | 3.6 | 6.9 | 5. Federal government should share in some of the expenses | 29.5 | 52.3 | 9.1 | 4.5 | 0.0 | 4.5 | |
| 5.4 | 8.4 | 30.7 | 39.2 | 10.2 | 6.0 | 6. State government should pay all expenses | 2.3 | 4.5 | 22.7 | 45.5 | 20.5 | 4.5 | |
| 8.4 | 7.8 | 30.1 | 37.3 | 10.8 | 5.4 | 7. Federal government should pay all expenses | 2.3 | 4.5 | 29.5 | 36.4 | 22.7 | 4.5 | |
| 26.5 | 25.9 | 22.9 | 12.7 | 6.6 | 5.4 | 8. Federal and state government and private industry should share the expenses for the continuing education of science teachers. | 29.5 | 29.5 | 29.5 | 4.5 | 4.5 | 2.3 | |

*Responses given in percent of relative frequency

SA - strongly agree, A - agree, U - undecided, D - disagree, SD - strongly disagree, DM - data missing

**Table 2
Demographic Data**

| | | | | | |
|------------------------------------------|----------------|---------------------|------------------|---------------------|--|
| SUPERVISORS | | | | | |
| Educational Background | | | | | |
| BS/BA | MS/MA | Masters Plus | Doctorate | No Data | |
| 0 | 4.5% | 52.3% | 38.6% | 4.5% | |
| Age | | | | | |
| 21-30 | 31-45 | 46-60 | Over 60 | No Data | |
| 4.5% | 43.2% | 43.2% | 2.3% | 6.8% | |
| TEACHERS | | | | | |
| Educational Background | | | | | |
| BS/BA | MS/MA | Masters Plus | Doctorate | No Data | |
| 54.2% | 16.3% | 26.5% | 1.8% | 1.2% | |
| Age | | | | | |
| 21-30 | 31-45 | 46-60 | Over 60 | No Data | |
| 28.9% | 49.4% | 18.7% | 2.4% | 0.6% | |
| School Building Student Population | | | | | |
| Less than 100 | 100-500 | 500-1000 | Over 1000 | Data Missing | |
| 2.4% | 62.0% | 19.9% | 13.3% | 2.4% | |
| Certification in Present Assignment Area | | | | | |
| | Yes | No | No Data | | |
| | 97.6% | 0.6% | 1.8% | | |
| Sex of Respondent | | | | | |
| | Male | Female | No Data | | |
| | 83.7% | 14.5% | 1.8% | | |
