

1966

## Report of Sciences Teaching Improvement Committee

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### Recommended Citation

Rom, Roy C. (1966) "Report of Sciences Teaching Improvement Committee," *Journal of the Arkansas Academy of Science*: Vol. 20 , Article 20.

Available at: <http://scholarworks.uark.edu/jaas/vol20/iss1/20>

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## REPORT OF SCIENCES TEACHING IMPROVEMENT COMMITTEE

Roy C. Rom  
University of Arkansas

This committee was organized in June for the following specific purposes: (1) to investigating curriculum and curriculum improvement, (2) to consider teaching and teacher improvement, (3) to publicize information concerning our first objectives and where possible, to offer constructive criticism in the form of recommendations.

As a committee we have no authority or jurisdiction. What may be said of us, is that we are the summation of many small voices crying in the wilderness. The wilderness of science education. Yet, these apparent disadvantages are our strength, for we stand in a juxtaposition between science teachers, the State Department of Education, and the school superintendents. We aspire to serve as liaison between such groups while being stand-offish enough to look at each objectively, to let each see himself as others see him, to be a genuine gadfly, if you please.

### Committee Members:

Mrs. Alice Brooks, Ozark  
Mrs. Gladys Giles, Fort Smith  
Miss Aileen McWilliams, Mena  
Mr. Freeman Thomas, Jacksonville  
Mr. Curtis Love, State Department of Education, Little Rock  
Dr. Jim Fribourgh, Little Rock  
Dr. Roy C. Rom, Fayetteville

The word curriculum is derived from the latin word currere, to run; it refers to the race course. Since we are racing to new goals today and since the old race course is worn and possibly leading in the wrong direction, many teachers, educators, and scientists recognize the need for curriculum improvement or change.

Whereas traditional science teaching may have had as its basis the accumulation of unrelated facts, new programs should concentrate on the development of concepts, principles, generalizations and issues of science. Teaching should draw lesson applications from the student's environment and experience.

In recent years some challenging proposals for updating scientific concepts and for redirecting learning, which leads to an understanding and an appreciation of science, have been built into the new science courses. Some of these programs have had extensive classroom testing. These programs suffer from lack of adequately trained personnel to teach them and poor classroom facilities to execute them. This is particularly true in the K-6 situation. To eliminate the difficulty of inadequate teacher preparation, colleges and universities that are train-

### *Sciences Teaching Committee*

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ing teachers must be challenged to update their own curriculum and to offer post-graduate orientation, retraining, and training opportunities to workers in the field.

To gain some background information on teacher training and experience, particularly as related to Arkansas schools, this committee conducted a survey in September. Considering the "average" Arkansas science teacher, 70.98% hold a BS degree, and 29.02% an MS degree. A look at the undergraduate major field of the science teachers reveals some disturbing information. Only 40% of our teachers meet the state certification requirements for science teaching which have as their basis **only 24 semester hours of subject matter.**

Our committee considers this unfortunate. This is not a criticism of the individual as much as an indication of the exercise of expediency on the part of school boards or their relegation of science to the category of unimportant in their total school program.

The survey indicated that a substantial number of teachers never attended in-service training or institute type courses. Only 2% were negative in their attitude; however, 40% were in the "it would depend on conditions" category. Sub-committees were organized to ferret out facts on three fronts, aimed particularly at meeting the conditions of this 40% group as well as all science teachers, such as: (1) teacher attitude on curriculums and type of workshops or institute sessions, (2) factors concerning teacher interest in such programs, and (3) current programs in Arkansas.

The cumulative opinions of teachers could lead to bold suggestions in curriculums which would deal equally with method and subject matter.

These should center on giving the teacher an understanding of concepts built on principals, which are the binding ingredients of science study and are useful in extending knowledge into new fields and which will not become outmoded with the passage of time.

As to method, teachers need and want instruction in the integration of text, lecture, recitation, and demonstration of their subject or the seminar approach. Special reference is made to the vital need of making all science learning relevant to the pupil by first making it relevant to the teacher. Teachers also require specific instruction in the use and application of the equipment, tools, and materials used as learning aids.

Initiation of such programs could come from regional science teacher associations who would propose a program and submit it to a college or university for activation. The State Department of Education should participate in terms of certification credit. Perhaps N.S.F. sponsorship for such programs might be obtained.

Many teachers would like to increase their professional competence but do not know how to go about it. At the same time they overlook information and opportunities available. There is a strong indication

*Arkansas Academy of Science Proceedings*

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that much information for science teachers is stalled in the principals office.

Some teachers are not particularly interested in any opportunity for growth primarily because their major teaching interest is not science even though they have some science teaching responsibility.

Salary increases for workshop participation would be a strong incentive, however, such a plan does not fit into most school board and administrative policies.

If workshops paid stipends of sufficient size to compensate for teachers having to forego other employment, teachers interest in education programs would be enhanced.

While regional workshops would still be inaccessible to some teachers, they would be very desirable in most instances and they would be a sound accommodation to teachers with family responsibilities.

A survey of 27 institutions of higher learning in Arkansas was made to learn about current programs in the state and to relate them to teacher requirements.

Only 5 schools are planning programs. One institution has programs for graduate credit, 2 others for undergraduate credit. Little scholarship money is available; where it is not, teacher registration for the course is low. The opportunities available for teacher improvement are thus very limited.

It appears that for financial reasons numerous teachers cannot avail themselves of the few available opportunities for self-improvement; for others the motivation for personal sacrifice for future gain is faint primarily because there is not much reality to future gain. Present opportunities in terms of current offerings by institutions in the state lack the luster to excite enthusiasm among working teachers.

The immediate challenge to this committee is to communicate these current ideas to teachers, school boards, faculties, and institutions of learning. Our hope is that in the future more opportunities will be available for improvement of the science teacher, that school boards will encourage improvement through incentive programs and rewards for excellence, and that teachers will use the opportunities to advantage. We recommend that:

1. There should be established in the school systems in the state of Arkansas a recognized program of science instruction in each of the elementary grades.
  - a. This program should be science instruction and known as such by parent, pupil, teacher, and administrator.
  - b. This program should be characterized by: A study of science through its principles, a study of science through pupil experience, a study of science through its relationship to the work and environment in which the student lives, a study

*Sciences Teaching Committee*

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of science through a progressive learning process culminating in the 8th grade with an emphasis on earth and physical sciences.

2. The teaching of science in the secondary school should be an expansion of previously attained knowledge with emphasis on concepts of chemistry and physics. Its purpose would be such that it could be terminal in nature yet act as a spring board for those going on to higher science learning.
3. A committee on curriculum construction work with the Arkansas Advisory Council on Secondary Education, Arkansas Academy of Science, Elementary Education Council, Arkansas Science Teachers Association, State Department of Education and any other interested or qualified group.
4. School administrators and superintendents recognize that a satisfactory science teaching program requires a specific science department in the school, equipped with audiovisual facilities, laboratory desks and equipment, and a library containing journals; magazines, keys, charts, manuals, and reference books.
5. School boards and administrators accept the State Board of Education's certification as a minimum requirement for employment and that added emphasis be placed on candidates having a university or college degree with a major and a minor in science.
6. Teachers continually examine all opportunities for furthering their science teaching skills through pursuit of science orientated in-service or institute programs.
7. Colleges and universities review and expand their current offerings for science teachers and see that they are answering the needs of teachers in the elementary and secondary schools. Where possible, these courses should have the incentive of graduate credit, and should have sufficient scholarship money or stipends available.
8. Science teachers be permitted to participate in the establishment of curriculums for in-service training programs.
9. In-service programs, where possible, be established on a regional basis and at a time when participation would be most convenient for the teacher.