

SECTION E, SCIENCE EDUCATION

Coordinating Science Instruction Within the System: Development of the Science Leader-Teacher

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Science instruction has several interrelated factors, so intertwined that one can hardly be improved without corresponding effort being made on the others. The net overall advancement goes little further than the least of any of them. These are the major factors that administrators must balance and coordinate: school philosophy, personnel, curriculum design, quality of instruction, equipment, class load and money. One more factor needs to be added, needs to be given considerable attention in the immediate future. It is leadership from within the ranks of the science teachers themselves.

It is our contention that considerable opportunity exists for teachers to develop individually through their specialized professional organizations such as the National Association of Biology Teachers, Central Association of Science and Mathematics Teachers, American Association of Physics Teachers and National Science Teachers Association. The opportunity is there. It becomes mainly a question whether individuals will grasp the chance. Those who do pursue an active role, benefit in personal as well as professional growth. But projection of this benefit to their own schools is less assured. A great need in Oklahoma schools, right now as in the past, is for collective development of science teachers and for better articulation of these teachers within the school system. This is where leadership is needed now.

Administrators must maintain a balance among the subjects taught within the school system. We all know of the local pressures that have left science in an underprivileged position in comparison with several other areas of study. But with the recent and current emphasis upon science, the plight of the science teacher working in an overcrowded classroom, on an overfull teaching schedule, and with equipment in less than working order and amount, deserves and must receive more serious consideration. Yet most administrators themselves are working with inadequate staffs and heavier loads than permit time for providing this extra leadership that is so badly needed.

It is easy to say that a science supervisor can and should be added to the administrative staff. This has been done in Oklahoma's two largest systems. Yet their names do not appear on the official roster in the published table of organization. These two systems represent the limit of applicability of the full-time specialist placed in the intermediate supervisory level, insofar as school financing is concerned. Furthermore, any extensive promotion of classroom teachers to such positions elsewhere would only strip the classrooms and weaken the overall instruction.

The problem of the very small school system is also different. Desirable as it is to have competently-trained (in science) teachers, the need for a full—or even a part-time supervisor is hardly as acute as in the intermediate-sized systems. Teachers on small staffs—say in the range of four to ten in the high school—can mobilize rapidly enough to exchange information. A science teacher in the high school can help provide the

help for the elementary teacher because working relationships between levels are already established within a small faculty.

Rather, the problem of the science leader is a problem of schools of 200 or more pupils in a one- or two-high school district. These schools are usually found in towns of 5000 to 50,000 population. In these schools, the science teaching load ranges from four classes for one teacher to fifteen classes divided among three teachers. In some cases, the load divides neatly for a full schedule in science for one or two teachers. These teachers do not have to fill out a schedule with another non-science subject. More often the teacher has to teach one or two quite unrelated subjects for which he may have had inadequate preparation.

A possible solution to this problem, and several associated with it, lies in creation of the part time science leader. This person continues teaching two or three classes, according to the needs of the schedule, but with no more than two class preparations. The balance of his time is then devoted to this complex of responsibilities:

- a. Consulting with elementary teachers on subject matter understandings for the upgrading of elementary science, including the design of simple experiments and arrangement of special in-service workshops,
- b. Assisting in evolving a scope and sequence distribution of topical matter for the entire K-12 program within the system, working with all teachers involved,
- c. Building a reference library in science, partly for motivating students, partly for building resource materials for teachers,
- d. Inventorying equipment, apparatus and supplies and then organizing the central supply room for most efficient use of a greater variety of equipment (in doing this, this science leader can well work with the shop teacher to increase the demonstration equipment that can be built locally),
- e. Consulting with neighboring schools to determine whether pooled buying of supplies can be developed, and
- f. Coordinating the planning and staging of local science fairs; directing science clubs and other student activity and motivation programs.

There is enough for one person to do on a half-time basis. But once the program is started and major goals defined, considerable progress can be made through long-range planning.

This calls for an above-average person. It does not call for omniscience but it does require a number of characteristics. Obviously, this science leader should hold a teaching certificate in science (Oklahoma standard or equivalent). He should be well regarded as a good teacher by his colleagues. He should be an effective teacher as reflected by the results in his students. He must have the ability to learn rapidly the methods, objectives and problems of elementary education. He must be a good organizer with aplomb equal to meeting unscheduled reactions of people as he moves from one age-group to another. He should be willing to work hard. He needs to be imaginative. Obviously he needs to know considerable science, some breadth, some depth. Most of all he needs to have the confidence of his administrator.

Do such persons exist? They are not already trained and ready to step into the job. Yet many high school science teachers can develop by judicious further study to where they can handle such an assignment.

The big question is whether the administrator and the system want to try to improve their situation. There may be 40 - 60 systems where this could be tried.

Should this science leader be better trained in biology or in chemistry or in physics? This field of training is not so important as the personal abilities of the individual. Of two individuals having approximately equal abilities but different science majors, probably the one with chemistry or physics is more likely to be helpful to the elementary teachers. This is because elementary teachers are generally weaker in their physical science backgrounds. However, there is no reason why two qualified teachers can't work as a supervisory team, if the system can support the joint effort.

The status of the science leader should not be left in doubt. His is a staff function, not in direct line of authority. He must learn and add supervisory skills, a task that must be done rapidly. It is not necessary that he hold an administrator's certificate. In fact, if he doesn't, he may be more interested in the science part of the work and less in administrative procedure. He should be officially recognized for this work, backed up by the superintendent (to whom he should be directly responsible) until the job is under control or the individual proven unequal to the leadership task. His pay should be enough more than scale for classroom teaching to emphasize the importance of the work. It need not match the incentive differential that draws men into administration.

Creation of this level of position holds these potential gains in overall science instruction: (1) incentive for teachers through merit recognition and advancement along a path alternative to administration, (2) challenge to take a broader view of science instruction at all levels by more teachers, (3) better coordination of curriculum, (4) improved and centralized stocks with better purchasing methods, (5) sustained effort in supporting student activity and motivation programs, (6) liaison with administration at a fraction of the cost for a full-time supervisor.

One obvious objection to this plan will be that if this be done for science, it will also have to be done for other subject areas. Why not try it in science and see if it isn't worth adapting to mathematics, modern languages and other areas? It holds hope for general improvement of curriculum and probably of student performance also.

Where does the plan exist? The author has had correspondence indicating that a somewhat similar plan operates in San Angelo, sufficiently successful to attract attention of Russian visitors. But he does not propose it for that reason. Rather, it is a suggestive approach to the resolution of several interrelated problems in some Oklahoma schools. No claim is made that it works in Oklahoma, but that it is only a suggestion that it can be made to work and to bring so many gains that it is worth trying.
