A Better Classroom Environment

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My assigned topic was "Recommended Minimum Equipment for Nature Rooms." I immediately objected to the title. The best "Nature Room" is the out-of-doors. We should use it as much as possible. Here nature study, the study of everything in the environment, can best be accomplished. But since it is not practical to do all our study of the natural sciences in the field, classrooms need to be equipped for such study.

If we believe that all children should have an integrated series of science experiences, from first through at least the ninth grade, and that nature study should receive a balanced share of the time allotted, then I think we can do this best in the regular classroom. At the junior and senior high school level, especially designed science classrooms with trained (?) science teachers are usually provided. It is true that a special room might be created with superior facilities, but its use would tend to be limited to periods when the room was available. A certain hour of a certain day of the month would be "our" time to study nature, instead of every day. And so the children might miss the emergence of a butterfly, the hatching of eggs, etc. The special room creates an artificial situation.

In providing a classroom environment for better learning opportunities in the natural sciences, the following factors must be considered: (1) teacher; (2) pupils; (3) room; (4) books; (5) special instructional supplies and equipment; and (6) school administration. There is no point in talking about equipment without considering the interrelatedness of these factors. I could have compiled a list of equipment from such sources as the monographs published by the California Elementary School Administrators' Association, such books as Hubler's "Elementary Science Teaching," and others of this sort, from lists accompanying various science texts and teachers' manuals, from the lists sent me by teachers, and, relying on my judgment based on my experience, compiled another list, had it duplicated, passed it on to you—and that would be that.

It will take more than the physical equipment to create an improved classroom environment. If a suitable environment is developed, it will come about because the teacher in that classroom believes that reading about science is not enough. She realizes that the study of natural sciences helps children understand and appreciate their natural environment. She believes that the most effective way to arrive at such understandings and appreciations is through direct observation and investigation. She must believe so deeply and intensely that a child must investigate and experiment to receive maximum benefits that somehow, in spite of handicaps and overwhelming odds, such opportunities are provided.

If the teacher lacks interest or loses hope when faced with her own inadequacies in the field of natural science, the overcrowded classroom, heavy extra-curricular load, inadequate instructional supplies and equipment, and poor administration, this is understandable. Teachers and administrators need help. Their own backgrounds in the natural sciences need strengthening. In-service workshops, attendance at Audubon Camps, Conservation Camps, Nature Camps, field study courses, some summer sessions, will help elementary teachers and principals gain confidence and the realization that at the elementary level one does not need to be a specialist, that one starts simply with common objects and common experiences. Additional study in the sciences, especially field courses, will help

the junior and senior high school teacher. NSF grants are a step in the right direction, but they reach too few teachers. Course offerings in college summer sessions are often not the kind which help the elementary or secondary school teacher.

The second factor in our list is pupils. The number of pupils becomes a critical factor in a nature study program which is based on first hand observation and investigation. Classes of 35 to 45 are common. It is no wonder that teachers resort to chalk, talk, and read about science at all grade levels, 1 to 12! Some add charts, models, movies, film strips and T. V.—all substitutes for direct experiences. All have their place but should not be used to the extent that direct experience, actual participation in investigation is eliminated. Many of the teachers I interviewed in preparing this paper said that what they needed most, if they were to do better teaching in the field of nature study, was a class size of 30 (maximum) and some time.

Pupils will help the teacher create the room environment if given the opportunity. With their help the collection of rocks, shells, seeds, and insects grows, and so does the picture file. Bottles, jars, cans, twine, wire scraps, fabric scraps, boxes, all the various no-cost materials which have so many uses, are added. And in the upper grades some simple equipment may be constructed by pupils with manual skills. Pupils bring in live plants and animals—providing the teacher will allow them—and the cages, terraria or aquaria, to house them are available. However, one should not depend on the children's contributions as the basic source of supply. Their contributions should only supplement those provided by the school.

Pupils will also help care for equipment, collections, animals, plants, bulletin boards, and exhibits.

The classroom may be a critical factor. If an active program of nature investigation is to take place, the room must be large enough, have adequate lighting, sufficient electrical outlets, sufficient blackboard and bulletin board space, plenty of storage space, demonstration area, sinks and running water (or a substitute in lower grades—at least a tea kettle and dishpan), provision for source of heat, work tables, book shelves, filing cabinet, and, again, *storage space*. Room facilities may make the difference between a good, indifferent, or no program in nature study.

A room set of textbooks and references should include books for the teacher. Reference books, manuals, texts on methods and materials should be in each room, not off in some central library. They should be handy for use in every day planning.

The books for the pupils should include a variety of field books and handbooks for identification. References on feeding and care of the animals which might be brought in should be included. There should be other books which help interpret, stress meanings, suggest activities. They should avoid fantasy and be accurate. These books should be in the classroom, to be used whenever the need arises. Several room sets of good science texts should also be available. Needless to say, these should be suitable to the grade taught. In the junior and senior high schools, it is desirable to have magazines such as *Natural History*, *Popular Science*, *Scientific American*, NABT and NSTA journals, and others in the room.

If we have a trained teacher, no more than 30 interested pupils, books, and a room with adequate facilities but no instructional supplies and equipment for nature study, we still may not have a good program. Our equipment and supplies should be ready, well organized, and conveniently stored in the classroom. Seldom used items to be shared with others should be on hand in the building. If a dragon fly comes zooming in the window, an insect net should be in that room ready for action. It won't do that class much good if it is in some central office down town. An observation cage should be easily accessible, as should equipment for killing and mounting if that be desirable.

Frequently the program is limited by lack of equipment or failure to be aware of what could be used. The materials needed for many experiments and activities need not be expensive, nor need they be difficult to obtain. Some can be secured at no cost, some can be constructed, others should be purchased. Regardless of how they are obtained, collecting and organizing the essential supplies and equipment is a persistent problem beyond the scope of the individual teacher. Natural science should be taught in all elementary classrooms, and in junior high science rooms

—not just in those of the skilled resourceful teachers who are willing and able to give the extra time and energy required to collect, construct, improvise, and purchase (often out of their own pockets) whatever is to be used. For a teacher to spend hours hunting resources and making equipment, which should be kept on hand, is not wise use of time.

Natural science will not become part of the school program until all school administrators realize that they must include commercially prepared science materials in the regular budget and that these may be obtained through the usual purchasing channels of that school system. It is important, too, that they see the need of an adequate budget at the junior and senior high level. The principal should take the lead in seeing that a standard list of supplies and equipment for science is drawn up and secured for each class and building. This list should be made with the cooperation of teachers who have the "know how" and the curriculum coordinator, if there is one. It should be subject to frequent review and revisions. When each classroom has been equipped, the principal should make possible in-service training, so that all teachers will have the knowledge and ability necessary to use it effectively. If some of the equipment is to be constructed by a group of skilled teachers, he should see that supplies, tools, and time are made available to them.

In order that the program may have flexibility and allow for teacher and pupil individuality, a limited cash budget should be set up. In all of this, the principal should take the lead. He should be aware of these needs and alert to their importance. Teachers should not have to do battle to secure instructional materials for the natural sciences, nor should teachers be forced to buy needed equipment themselves.

In the elementary school, complex technical equipment is not necessary nor desirable. Whatever is selected should be simple, adaptable, sturdy, safe enough for the child's use. Make use of familiar materials as much as possible. Of course such things as aquaria, terraria, animal cages, insect rearing cages, dip nets, insect nets, boxes and glassware and riker mounts for housing and displaying of collections, flower pots and small gardening tools; simple apparatus for studying the earth's crust and its changes, air and weather, light, seasons, the universe; magnifying glasses, mirrors, prisms, magnets, devices for weighing and measuring, are usually found in the well equipped room.

In the junior high school science classes, the natural sciences—nature study—should have a place. Some of the same equipment is used at this level. Other, more complicated, apparatus will be used as the work becomes more advanced. More apparatus can be devised by the students. Now a special science room, science teacher, and a special time is usually set aside. In high school, the biology teacher usually carries the nature study program forward—if it continues at all. Here more equipment is needed—microscopes, microprojectors, cages, aquaria, terraria, pressure cooker, oven, glassware, chemicals, etc. I shall not attempt to give a complete list but merely remark in passing that there are far too many text-bound biology classes in the country, and lack of equipment is one of the reasons for this.

To conclude then: Recommended minimum equipment for the creation of an environment in which better learning opportunities for an active nature study or natural science program are provided consists of:

(1) A teacher dedicated to the nature study philosophy
(2) A maximum of thirty pupils
(3) Adequate room facilities
(4) Appropriate and sufficient texts and references
(5) Necessary supplies and equipment for a program of active investigation
(6) Helpful, sympathetic, and understanding leadership from administrators.

Hibernating Animals

Dr. X. J. Musacchia, professor of biology at St. Louis University, claims there are unlimited possibilities for the future use of hibernating animals in biological studies in outer space. Dr. Musacchia explained that hibernating animals such as turtles, ground squirrels, bats, and woodchucks are already in a slowed rate of metabolism and would provide an excellent opportunity for prolonged gravity free state studies.