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The method of teaching science in which a certain amount of opportunity is given each student for work by himself in the laboratory (the so-called individual laboratory method) is of fairly recent development. Many of the early American professors of chemistry did not believe that the beginning student should be allowed to set foot in a laboratory. This was undoubtedly due to the fact that these instructors were educated under the German system of class-room demonstration. According to Lucasse (1) the credit for the development of the first chemistry laboratory for instruction goes to Lomonossoff (1748). Later the passage of the Morrill Land Grant Act of 1862 caused a great development of the laboratory method, in that during the period 1880-1900 there were a great number of university laboratories constructed.

Despite the wide acceptance of this method of chemistry instruction there are still many instructors who question its efficiency and effectiveness. Many papers have been published to argue on one side or the other of the debate *The Individual-Laboratory Method vs. The Lecture-Demonstration Method* (2-8). At least two large universities, Purdue and Indiana, prefer the demonstration method, but use laboratory instruction because many of the students plan to teach science in high schools using that system.

In the liberal-arts college the great demands on the time of each student challenge the instructors to find the most efficient methods of teaching. This fact coupled with the plan of uniform tuition with no fees of any kind at Iowa Wesleyan College brought up the question of the best use of time and money in instruction. To see how other institutions answer this question catalogues from more than 160 four-year colleges and universities of all types were examined. The results of this study are given in Table I.

Payne (9) also made a study similar to this one.

It can be seen that there is a great diversity in systems of general chemistry instruction. The most popular plan is the one of three one-hour lectures and recitations and one laboratory of three hours per week. Very widespread also is the plan of two hours of lecture and recitation and two laboratories of two hours each.

Table I. Time Distribution for General Chemistry Instruction in Various Colleges

No. of Lectures Per Week	No. of Laboratory Periods Per Week	Hours in Each Laboratory	Frequency
2	1	2	4
2	1	2.5	1
2	1	3	5
2	2	2	21
2	2	2.5	3
2	2	3	7
2	3	3	1
3	0	–	4
3	1	2	10
3	1	2.5	4
3	1	3	44
3	1	4	9
3	2	2	17
3	2	2.5	2
3	2	3	14
3	2	4	1
4	0	–	2
4	1	3	9
4	1	4	3
4	2	2	3
5	1	2	1
5	1	3	3
			Total 168

No arrangement for instruction in general chemistry can be made without keeping in mind the aims of the course. The Committee on Examinations and Tests of the Division of Chemical Education of the American Chemical Society (10) has given the accepted objectives in teaching general chemistry. These are stated compactly: "To provide pupils with a broad and genuine appreciation and understanding of chemical aspects of the world in which they live, and to give an opportunity for training in the scientific method of thinking through the study of chemical problems."

As a result of these considerations we cut down the amount of time spent by the student in the laboratory to one period of three hours per week. This gave us three hours per week for lectures, examinations, and demonstrations. The former system used for more than five years was to require the students to spend six hours in the laboratory and two hours were given to lectures, etc. Some intelligence tests and aptitude tests of various kinds taken by the present students upon entrance to the college showed them to be of the same ability as the preceding classes, hence a good chance for comparison of the methods was given.

The results of this experience seem to be:

(1) Carefully conducted individual laboratory work for three

hours for work in general chemistry is sufficient for imparting all the advantages of this method.

(2) Much saving in costs of materials results so that more equipment can be supplied to upper classmen to use for their training and research.

(3) The instructors are given more time in which to prepare for lecture demonstrations.

(4) Finally, the course is more popular with the students. This fact is not to be taken lightly because voluntary enrollment in general chemistry courses has not kept up with increase in student population.

BIBLIOGRAPHY

1. LUCASSE, J. Chem. Ed. *5*: 142 (1928).
2. BLANCHARD, Science, *50*: 112 (1919).
3. HUNT, J. Chem. Ed., *12*: 73 (1935); *13*: 29 (1936).
4. BERGER, *ibid.* *12*: 229 (1935) (for good bibliography).
5. CARMODY, *ibid.* *12*: 233 (1935).
6. SCHLESINGER, *ibid.* *12*: 524 (1935).
7. COOKE, *ibid.* *15*: 592 (1938).
8. GOLDSTEIN, Sciene Education, *21*: 185 (1937).
9. PAYNE, *ibid.* *9*: 1097 (1932).
10. O. M. SMITH, *ibid.* *12*: 180 (1935).

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