INDIVIDUAL LABORATORY WORK IN PHYSICS.

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After an experience of over ten years as teacher of physics, during which time I allowed pupils to work in groups of two or sometimes more, I determined last year to try the individual plan, *i. e.*, to have each pupil work entirely alone. I was led to try this plan because it did not seem to me that the group plan was entirely satisfactory for many reasons, a few of which I will state.

When two pupils work together, it is usually true that one of them is better prepared, more aggressive, or not as lazy as the other and hence does by far the larger share of the work and thinking, the other acting simply as a copyist. The confusion arising from necessary—to say nothing of the unnecessary communication—when pupils are allowed to work together is, it seems to me, detrimental to best work and progress. Pupils working together are apt, especially if there is a party, sleighride, or other amusement in anticipation—and when are these not in anticipation in the modern high school—to mix their experiments with their social affairs.

Since we had a new building in process of construction last year which we were planning equipment for, the time was ripe for any change as radical as having a table constructed for each pupil, which is what we finally did, after having the pupils do individual work at the large tables with which the old building was equipped in order to try the plan. The physics laboratory in the new building is a room about 24x32 feet in dimensions. It contains eighteen tables, each two feet wide, three and one-half feet long and thirty inches high, arranged with convenient aisles between. These tables are similar to library tables, in construction heavy and substantial. The legs are of oak 3x3 in., the top is built up of maple strips $1\frac{1}{2}$ in. thick, finished black. Each table is equipped with an ink well and two brass plates, one near each end, set flush with the table top tapped to receive $\frac{3}{4}$ in. nickel plated support rods. The tables contain no iron or steel in their construction. Gas is obtained from a pipe extending along three sides of the room. When we wish to use gas we move the tables near the walls. Of course there is other equipment in the room, but since I am dealing with the individual phase of laboratory instruction, I will omit any further description and simply state results.

We had sixty-eight pupils taking physics last year and had them divided into two divisions for lecture and recitation purposes, and into four divisions of seventeen each for laboratory work. Each pupil had four single periods in the lecture room and one double period in the laboratory each week. It was, therefore, necessary to have seventeen sets of apparatus or else to have more than one experiment in progress at the same time. I have an average of about ten sets and have two or possibly three different experiments in progress. I find this no great disadvantage, for by keeping one-half of the pupils one experiment in advance of the other half, they all take the course in logical sequence. To be sure it takes a little more equipment, but laboratory equipment is so inexpensive in comparison with the better results obtained that the additional expense is worthy of small consideration. It seems to me that it is our duty as educators to attempt to secure what some one has called a "mental wriggle" as often as possible, from our more lazy and inert pupils especially, and I am satisfied that I secure it much oftener when those pupils know that they must either do the work, solve the problems and answer the questions themselves, or secure necessary assistance from the instructor.