

## IN THE CLASS ROOM.

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Class room instruction has undergone a considerable transformation during recent years. In fact, what was once almost the only method is now all but discarded, while different plans scarcely thought of a few years ago are rapidly superseding it. At least two causes appear for this change: one, a change in the subject matter taught, the other, a change in the attitude of the teacher toward his work. Once only those subjects were taught which had been thoroughly worked over, discussed and written upon for years. Now much of the subject matter in the sciences is the result of research during the last ten years, and every twelve month contributes its items to the general fund of knowledge, while every aggressive teacher must correlate the items and reduce them to their places in the sciences. Today investigation or the laboratory method is the rule while formerly the student was only required to commit to memory what others had worked out. Now the teacher allows the student a very free rein in the matter of opinions and conclusions, and often even in what he studies merely directing the work, while in past days the student was expected to do and to think as did his teacher.

Once the teacher presented his own personality to the student. He inspired by his own purpose. His influence was a dominant factor in his results. Now the profession has less of dignity and the pupil less of respect for it, hence personal influence is not nearly so great an ingredient in the pupil's education. Pupils rarely aim or wish especially to emulate their teachers but they do want the truth that will help them to win in the world. Formerly facts were taught, now the methods for acquiring the facts are taught. The movement from one ideal to the other is so complete and the ends so antipodal that the change may be likened to the swing of the pendulum from one end of the arc to the other. Which end of the arc represents the highest ideal is at present immaterial. The pendulum swings, acting and reacting, but never settling down into one steady course. In many ways the

swinging is helpful. In the aggregate the changes will prevent stagnation in our work.

With the new subject matter and the new attitude of pupil and teacher to the former and to each other have come many new class room methods whose value is being determined by use.

Text book assignments alone and verbatim recitations are rare where once they were common; collateral readings with reports form an increasing factor in the scheme of many teachers. For subjects whose material is widely scattered through the current literature, the lecture system plays a large part; a method especially developed when the teacher is inclined by nature and permitted by his work to keep thoroughly abreast of the times. The purely inductive or laboratory method is in high favor. The disputation or Socratic method so valuable as a thought stimulator, and so full of work for the teacher, is still in vogue in some class rooms. It should be in all.

The reception of these various methods varies. Pupils criticize every method. One scheme suits this set while another is popular with a second set. Many students are attracted to a well presented lecture course, because it puts new, live material in a clear, orderly way; but few students, except the more advanced in colleges, seem able to retain and reproduce in proper relations the facts so set forth. It has been our experience that the student, even though he takes notes, does not get the mastery of his subject until he has put it into his own words and has himself given it expression. One can scarcely be said to know a thing unless he can tell it. The psychologist teaches that repetition fixes a fact; and that repetition under the strain of class room attention is still more effective.

Of course the more advanced the student becomes, and the more experience he may have had in telling what he knows, the less the real need of the teacher as questioner. The pupil learns to question himself. But the earnest student during his high school, academic and college work welcomes the careful questions. I should like to see in many class rooms a more exalted position given to the question and answer method. It means more work for the teacher, but it also means better results to the pupil. Let the

teacher study with a view to questioning; seek questions that develop discussions, and those that bring out relations of related things. Rarely spend the time asking questions that can be answered by yes or no. Make the questions short, clear and logical but do not color them with personal opinion. There is a time to impart personality but it is not in the question. Try to get at what the student *thinks* about the matter, and what he does not know as well as what he does know. Under fire of questions he should find a more comprehensive viewpoint.

There is such a thing, however, as trying to lead a student where his knowledge is insufficient to follow, but a wise teacher will usually avoid such territory. Childish and abstruse questions are alike to be avoided. Simplicity and clearness do not militate against depth. In fact without both no very great depths can be reached. Questions should not be labored or fraught with weighty rhetoric, but should be conversational, personal.

Lectures by teachers and reports by pupils should have their places in the class room; but they serve their purpose better if they, like the text book assignment, are followed by the quiz.

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## PHYSICAL CHEMISTRY.

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Chemistry may be studied from two standpoints. We may investigate the subject with a view to discovering all the possible chemical compounds and of becoming acquainted with their properties. This may include also the study of chemical reactions in so far as some compounds are decomposed and others formed. This branch of chemistry may be called *descriptive chemistry*.

Again, the subject may be approached with a view to discovering the laws governing chemical phenomena and of examin-