By proceeding thus with every definition, taking care that the *pupils* do the work, which should have been prepared previous to the lesson, ideas will be garnered and not words only.

Then in a similar manner the properties of the figure, or the powers of the truth should be illustrated before using it in abstract reasoning. For instance, taking the triangle again, it may be experimented with as follows :—Form a quadrilateral with four sticks. It will be found that the sticks may be moved in various directions but yet continue a quadrilateral. But form a triangle from three of the sticks and the figure is fixed. The sticks cannot be changed in relation to each other and yet continue to be a triangle.

Another element in the successful teaching of geometry of the highest importance is that the truths learned by demonstration should be understood in their application. That no truth is well *learned until it can be applied, is a truism. Instead of hurrying* from theorem to theorem without halting to consider their use, pains should be taken, after every truth has been known as a fact and proved, to drill the pupil upon its application. Give him examples of its use, and set him to work searching for other examples For instance: "The opposite sides and angles of a parallelogram are equal to one another and the diagonal bisects it." The application of this truth may be shown by reference to the parallelogram of forces, the steam engine, etc. The principle of the isosceles triangle is used extensively in common examples of architecture, the use of tangents in railway curves. Examples will suggest themselves abundantly to any observer. The pupil should have as much liberty allowed him as possible to experiment, to investigate, to question, to think. Every effort should be made to encourage him in these exercises. Excite his curiosity by hints of the importance of the subjects and of the valuable secrets to be yet acquired If discouragement shows itself at the outset, excite him to fresh ardor by representing the uselessness of any attainment acquired without difficulty. There are unknown wonders to be discovered, but only to those who are willing to brave the difficulties.

Gratify the pupil by leading him to make discovery of new ideas. Nothing will please a pupil so much as to hit upon an idea after repeated experiments. Give him full scope for the exercise of his own thoughts. Nothing should be shown him which he can discover for himself, nor should any mechanical work be done by the teacher for the sake of rapidity or other reason which the pupil can do for himself. Nothing should be taken for granted. Every line, angle, etc., spoken of in the demonstration should be drawn. It is said of the celebrated Faraday, when lecturing to children, that he would not take for granted that an apple would fall to the ground if left unsupported. He would actually perform the operation.

Having now stated a few general points to be kept always in view, I will explain the order in which I would take up the various parts of a set of geometrical propositions.

1. It is necessary at the outset to understand and thoroughly memorize all the definitions.

2. Then the propositions to which they refer may be taken up. As it is in this part of the work above all others that correct methods of teaching are necessary, I will mention a few exercises and precautions to be observed by the teacher, which will do much towards facilitating the perfect and speedy acquisition of a lesson.

In the first place the teacher will find much value to arise from simplifying the proposition and making it interesting by means of a familiar talk previous to assigning any lesson. Unless the truth can be readily appreciated the pupil is most apt to learn it by rote. *It should be the aim of the teacher, by the preliminary talk,* to make the matter so plain as to remove all inducement for rote-learning. In this preface to the lesson we should show to be true, in one or more cases, what will afterwards be shown to be always true. No preliminary exercise will be so valuable as to lead the class to discover the truth for itself. Our object in this exercise is to make the pupil grasp the truth, to awaken his interest, and to remove difficulties. Wormell provides the substance of valuable conversations such as I propose. The importance of such a collection can only be known to such teachers as have experienced the difficulty of framing original examples. It is a task of great difficulty, and involving the use of much ingenuity and labor to provide on the spur of the moment such illustrations as would be of value and interest, the more especially when it must be borne in mind that to profit his class the teacher should confine his illustrations rigidly to the leading and peculiar features of the lesson.

After such a drilling as is thus recommended the pupil would go to the study of the demonstration incited by curiosity and ambitious of excelling, and not discouraged by continually recurring obstacles.

Perfect accuracy in workmanship should, in all cases, be required. The figure should be placed on the board by the pupil with neatness and accuracy in the mechanical parts, and the truth proved with mathematical precision and order. Nothing clumsy in diagram, inelegant in language, or ungraceful in posture should be permitted. Every stroke of the chalk made by a child, every word he utters has its influence in the formation of his character.

It is an excellent plan to cause the pupil to go over the demonstration without the aid of a figure. But care must be taken lest this exercise should degenerate into an aid to rote-learning, the most pernicious negative influence the teacher has to encounter in teaching geometry, To young pupils whose memory is stronger than their reason, it is far more easy to learn by rote than by proof, and unless great pains are taken to prevent it all our teaching will be vitiated b this evil.

It may, to some extent, be avoided by reversing the figure or by different lettering. But I think more can be done by appealing to the judgment of the pupils themselves. I believe strongly in the power and will of young people to obey their judgment if it be appealed to, and the danger of disobedience presented in its true colors.

3. Having finished a set of theorems, problems and exercises founded upon them can be taken up. It is a great mistake to omit the problems. They offer the most potent means of fixing the truth in the memory, and have besides an eminent value of their own in forming correct habits of thought and training the mind in reasoning and observation.

4. After finishing a series of propositions, a very complete and thorough review should take place. All the leading and peculiar points should be brought out clearly and reiterated; all definitions and propositions should be repeated carefully and systematically.

I may say in closing that, though it is necessary to gather together and to memorize many facts, yet the teacher should always regard such memorization as a subordinate exercise. The grand end of all teaching is to lead the pupils to grasp principles. Many years are spent by each of us in making observations, in undergoing experiences, but how few grand principles we acquire, how seldom we manage to combine our experiences and trace a truth underlying them all, and producing them. It takes many observations to lead to the discovery of great ideas; but few such can be obtained in a life-time, notwithstanding the acquisition of multitudes of facts. *Yet it is by the possession of great ideas that great minds are distinguished,* and not by "an infinity of loose details."