

THE TEACHING OF MATHEMATICS IN THE JUNIOR HIGH SCHOOL.

From *Methods of Teaching in High Schools* Chapter IX — Samuel Chester Parker.

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The *subject matter* in the teaching of mathematics in the Junior High School will be primarily arithmetic in Grade VII, arithmetic and algebra in Grade VIII, applied algebra and arithmetic, mechanical drawing and elementary geometry in Grade IX; or an alternative and more practical course in Grade IX might consist of commercial mathematics, accounts and household accounts.

The *method* in teaching mathematics is known as the problem solving method, which may also be applied to any subject on the school course, for each lesson in each subject should present a definite problem for solution.

The first step on such a lesson is to *define the problem*; that is, to get it in mind and to keep it in mind. It will be found interesting to note three definite degrees of efficiency in the definition of the problem. Some members of the class do not see any difficulty at all, others feel that something ought to be done but have no clear idea of what to do, while others begin to turn over in their minds various suggestions of method in the solution of it.

There is one point which must be urged upon the teacher who wonders why the class cannot keep the problem in mind. All that is necessary is to ask her if one has ever been one of a committee of adults for the furtherance of any charitable or patriotic movement? Did her mind — and conversation — never wander from the business in hand?

The next step in problem-solving is, in the words of Dr. Parker, "*stimulating fertility of suggestion*." Other things being equal, the person who thinks of a hundred matters related to the problem in hand is more likely to find a helpful suggestion than the person who thinks of only ten. In other words, fertility of suggestion is a helpful factor in problem-solving. This fertility depends on two things,—previous knowledge, and the ease with which this previous knowledge may be recalled. How can the teacher best help the child to bring to bear upon the problem in hand the facts from his previous knowledge which will be of greatest value?

It is made easier by: 1, Systematizing the process of search. 2, Limiting the number of

classes amongst which the pupil must search for the right one. 3, By informing him of classes which include the right one and which he would neglect if undirected; and 4, By calling his attention to the consequences of membership in this or that class.

The third step in problem-solving is the *critical, unbiased evolution of all suggestions*. In order to criticize successfully the teacher must maintain an attitude of suspended judgment both in order to provide for a thorough canvass of the problem and also not to interfere with the thinking going on in the individual minds of the class. She must not only criticize herself but will also stimulate the class to criticize each suggestion and to think out its possible consequence.

Having arrived thus far it will be found necessary to *organize the material obtained*. Dr. Parker considers that in organization of material two steps are necessary: First, taking stock and keeping systematic check on the field covered, especially when the problem is one which requires considerable time for its solution; and secondly, in checking, using methods of tabulation, or, where possible, graphic representation.

Dr. Parker in concluding his chapter on problem-solving in "*Methods of Teaching in High Schools*," sums up the whole question as follows:

"To stimulate and assist pupils in carrying on reflective thinking (*i. e.* problem-solving) the teacher should:

I. Get them to *define* the problem at issue and keep it clearly in mind.

II. Get them to *recall* as many related ideas as possible by encouraging them.

1. To analyze the situation.

2. To formulate definite hypotheses and to recall general rules or principles that may appear.

III. Get them to *evolute* carefully each suggestion by encouraging them.

1. To maintain an attitude of unbiased, suspended judgment or conclusion.

2. To criticize each suggestion.

3. To be systematic in selecting and rejecting suggestions.

4. To verify conclusions.

IV. Get them to *organize* their material so as to aid in the process of thinking by encouraging them.

1. To take stock from time to time.

2. To use methods of tabulation and graphic expression."