

Halpen, Rosa (1890, December 13). Number Teaching. *Rochester Daily Paper for Our Little People*. 11, (84), pgs. 183-187.

Number Teaching.

The following paper on Number teaching, by Miss Halpen, was read at the Teachers' meeting of last week :—

The two principal ends aimed at in teaching number to children are the cultivation of the reasoning powers and the formation of a habit of rapid and accurate calculation. It is the duty of the teacher to discover by what means these ends may be most successfully reached.

An experienced teacher of number has said : "The association of arithmetical ideas with perceptible objects alone makes arithmetic intelligible to a child," and any teacher who attempts to impart even the simplest ideas in arithmetic without the aid of objects will speedily see the truth of this. Children cannot conceive of abstract numbers. Figures mean nothing to them unless associated with objects ; then and not until then do they make a definite impression on their minds. They gain their first knowledge of numbers without being taught, unwittingly, from the objects which they use in their play—their marbles, jackstones, and balls. Hence their ideas of numbers are intimately associated with objects. This fact should be taken advantage of by teachers. In every number lesson each child should be provided with a variety of objects with which to illustrate his work. Grube may be quoted on the importance of this. He says : "The hand is a very important means of education ; and it seems evident that pupils in the primary grades who are allowed to handle suitable objects, to count them, to arrange them so as to represent the problems given to the class, will be able to do better work than if instructed in this important study without the help of objective illustration."

The wise teacher will see when objects have performed their part, and are no longer needed ; she will realize that they are not an end, but a means to an end, and that when pupils have gained the abstract idea from the concrete objects and are able to perceive the relation between numbers as well without objects as with them the latter can be laid aside. Another important fact to be borne in mind is that every lesson in number is also one in language. When a child after reading

an example presented to the class seems confused and turns to the teacher for help, he should be promptly referred to the language of the example, and the fact impressed upon him that the language of every example tells by what process the work is to be done, and he must study the language before attempting to do the work. On this subject also Groube may be quoted: "We cannot impress too much upon the teacher's mind that each lesson in arithmetic must be a lesson in language at the same time As long as the language for a number is not perfect, the idea of the number is also imperfect."

With deaf children, the greater part of whose time must be spent in the acquisition of language, number teaching during the first year should be introduced rather as a game, given the children by way of change and recreation rather than as a study. The number game should be played with objects and the children taught to associate the idea of numbers with the objects. In this way they should learn to count up to ten and to recognize the figures at sight.

During the second year pupils should be taught the combinations which are found in numbers up to ten. Thus: that 4 is composed of two 2's or of 3 and 1, and that when two are taken away two remain; when three are taken one remains and *vice versa*. In this way addition and subtraction are taught at the same time, and it will always be found best to teach them in this way rather than separately as they are usually set forth in arithmetics. By force of contrast the two are understood more readily when taught together, and less time is expended. Toward the close of the year the class may be given written examples, very simple, each example embodying but one principle. These examples will be made more real and interesting to the children if they themselves are the objects used in illustrating. A number of children, say two, may be sent into the hall, and a statement of the fact written upon the board; then three more may be sent out and that added to the example, and the question asked: "How many children went into the hall?" The answer should be required to be given in both language and figures: "There are five children in the hall— $2+3=5$."

The next example may be one in subtraction. Three of the children may come in and the following example be written: "There were five children in the hall and three came in. How many children are left in the hall?"

At the beginning of the third year the children should be taught to count up to twenty. Small objects may be substituted for illustrating and somewhat higher figures used, as : "George had 6 marbles and his father gave him 4 more. How many marbles had George then? Albert had 9 nuts and ate 3. How many nuts had Albert left?"

Abundant practice should be given with such examples as these. The interest in the work will be greater if the names of pupils and their experiences are brought into the examples. Let them use simple words, as "take away" for subtract until they are more advanced. When the teacher is confident that the pupils have become well grounded in the two processes of addition and subtraction, both as to language and figures, multiplication may be introduced. It should be presented in such a way that the children will see that it is a short method of addition. A variety of operations performed with objects will make this clear to them. The nature of the examples might be as follows: "I see three boys sitting on a bench. Each boy has two eyes. How many eyes do I see? There are 2 tables in the room; each table has 4 legs. How many legs have both tables?"

Examples in addition and subtraction should continue to be given, and toward the close of the year the class should be able to work examples embodying any one of the three principles rapidly and understandingly. They are then ready for division, which should be presented as a short method of subtraction, the examples being of the nature of the following: "I have 6 cookies. I wish to divide them equally among 3 boys. How many can I give to each boy?" "Myrtle went to the store with 10 cents. The store keeper told her that apples were 2 cents apiece. How many apples can Myrtle buy?"

The B class should learn to count to 100, to write the names of the cardinal numbers, ordinal numbers, and their abbreviations, and to understand Roman and Arabic notation up to 100. Their practice should be with examples containing one or two of the four processes, as :—

"Henry went to the barn to look for eggs. He found 4 in one nest and 5 in another. But he dropped 2 and broke them. How many had he left? George went down the river for pond-lilies. When he came back he gave 4 to Ada, 2 to Bertha, and 3 to Esther. He threw 2 away and had 3 left. How many did he have at first?"

For the A class a great variety of examples, embodying two, three, and even all four processes should be prepared, as :—

"John went to the barn to hunt eggs. He found 4 in one nest, 2 in another, and 5 in a third. He dropped three and broke them, and he sold the rest at 2 cents each. What did he get for them? Fred has a new suit of clothes. There are two pockets in the pantaloons, 3 in the vest, and 4 in the coat. He has two cents in each pantaloons pocket, 3 cents in each vest pocket and 1 in each coat pocket. How many oranges can he buy at 2 cents each, and how much money will he have left?"

As variety is as desirable in number as in any other school exercise, the teacher must tax her ingenuity to devise different ways in which to carry on her work. Store-keeping is a thing which never fails to arouse the enthusiasm of a class, and which always proves instructive both in number and language. The teacher's desk can be turned into a store and furnished with such a variety of articles as can be conveniently obtained. With the lower classes it is better that the teacher should be the store-keeper in order that she may teach the children the colloquial language which it is so desirable they should learn; but with the more advanced classes the children may take turns in being store-keeper. The buying and selling should be closely supervised by the teacher, in order to see that the work is done right, and to correct any mistakes that occur. In the absence of real or toy money, small objects such as buttons, may be used to represent pennies. After a purchase has been made the whole class, including the buyer and seller, should be required to write a statement of the fact as concisely as they may be able, in the usual form of an example. Another pleasant exercise is that of measuring. A tape-measure being provided the class may be allowed to take turns in measuring the length, breadth, and height of the various objects in the room, and examples may be written by the class telling how many feet or inches they measured, or how many inches an object lacked of being a foot long, or how many feet of being a yard.

In order to gain as much language as possible each example written by the teacher should be copied in full by the pupils and the answers written in full; nor should the teacher be satisfied with the fact that the correct answer has been found, but should insist upon seeing the *process* by which it was obtained; for, as Grube says, "An example is not done when the result has been found, but when it has been solved in a proper way."

Arithmetic is an exact science; its chief value is its correctness, and that time is not wasted which is given to securing exactness in all work with numbers. When a child fails to

work an example the teacher should take pains to discover whether it is because he does not understand the language or because he is unable to perform the operation.

As little children have to be taught the meaning of such words and phrases as "gain" "loss" "spent" "equally" "more than" "less than" it is best to take them in examples one at a time, seeing that they are thoroughly understand.

While work with applied numbers should be most frequent, a few moments each day may be profitably spent in practicing with pure numbers in order that the children may gain rapidity and accuracy in mental operations. For this Sanford's drill cards are excellent. In number work more than in any other "hasten slowly" should be the motto of the teacher. Lasting injury may be done by hurrying children beyond their capabilities. Each step should be mastered before taking one in advance, for the work is practically a failure if not thorough. Better have one example performed understandingly than a hundred that are but partially understood.

Especial attention should be paid to dull pupils and to those who show a disposition to shirk their work. The former must be given plenty of time to think and much encouragement; the latter should be made to feel that the teacher's eye is upon him and that any attempt on his part to copy from his neighbors or do his work carelessly will be promptly detected.

As Miss Halpen's paper was not written for the general public, but to be read before a gathering of the teachers of our own school; for teachers in other schools who may wish to read the paper for comparison, or suggestions, this note is added:—The first, second, third, fourth, and fifth years, refer to years in the kindergarten for the children ranging from six to twelve years of age. The classes Miss Halpen has written about are called by our method of naming the E, or entering class, D, C, B and A classes of the kindergarten.

In we had but more faith, we should have less care. *Halpen*