CHAPTER 4
PRACTICAL EXAMPLES TO ILLUSTRATE THE SENSE AND MEANING OF REDUCING THE LEARNING MATERIAL FOR CONSTRUCTING A MATHEMATICS LESSON STRUCTURE

4.1 INTRODUCTION

In the previous chapters there was an attempt to give a theoretical explication of the place and value of reducing the learning material for each phase of the course of a lesson. Now, in order to give such theoretical pronouncements content, in this chapter a number of examples are presented that can serve as guidelines on the basis of which a practice can be planned and implemented.

For the sake of simplifying the matter and to be able to more directly indicate relationships between the activity of reduction and the relevant aspects of the larger unity of the lesson, the explication in this chapter is divided into two main moments:

a) A number of themes were chosen from the mathematics syllabus in terms of which an attempt is made to construct effective examples for each successive phase of the lesson structure. At first, to illustrate each phase of the course of the lesson, a separate theme is chosen and reduced to its essences. The aim is to try to show the relationship between the essences of the matter, as disclosed by the reduction step, and the successive sequence structures (phases) such as, e.g., actualizing foreknowledge, stating the problem, and others. This then can serve as a guide for the teacher and at the same time he has the opportunity to acquire step-wise experience with the problems that show themselves during the reduction activity.

b) Because these aspects of the lesson structure cannot be meaningfully understood separately and apart from each other a summarized image therefore is given in which the entire course of a lesson is planned in terms of one particular theme. It is hoped that such a complete image of an example lesson succeeds in offering a total image of the interaction between lesson planning and reducing

the learning material and that also must serve as a model for future designs.

4.2 AN EXAMPLE FOR EACH PHASE OF THE LESSON STRUCTURE

With the successive phases of the course of the lesson as the point of departure there is an attempt to show in terms of particular themes the meaning of reducing the learning material for these particular divisions of the lesson structure.

4.2.1 The learning aim and reducing the learning material

a) *Theme:* (Algebra, Standard 6 [Grade 8]).
Cardinal number (Definition).

Remark: A cardinal number is viewed as the common unit of equivalent aggregates:

Notation: n {a; b; c} = 3.

b) *Reduction of the theme*
The essence of this theme is in:

(i) *The concept "cardinal number"*
    It is a number that merely indicates the number of units of something but not their order. For example, in the formulation "three apples", "3" is the cardinal number. The common units of the aggregates {a; b; c} and {1; 2; 3} is that both include the same "number" or number of elements; therefore
    {a; b; c} ▼ {1; 2; 3}.

(ii) *The notation system*
    {a; b; c} = 3.
    or if A = {a; b; c} n(A) = 3.
    n = cardinal number.

(iii) *The meaning of the cardinal number in the number system.*
    {cardinal numbers} =
    {natural numbers} from {0}.

c) *The learning aim*
The essence as manifested by the reduction of the theme is the learning aim that the child is going to make his own.

      This culminates in the following aspects:
      (i) Insight into the concept cardinal number.
      (ii) The insightful mastery of the notation system, e.g.,
          $n \{a; b; c\} = 3$.
      (iii) The distinctive characteristics of the cardinal number with respect to other types of numbers such as natural numbers.

4.2.2 The lesson aim and reducing the learning material

a) *Theme* (Geometry, Standard 7 [Grade 9]).
If two lines intersect the opposite angles are equal.

b) *Reduction of the theme*
When the teacher looks for this theme in the syllabus and searches for its essences he can delimit as essential the concept *opposite* as well as the *method* by which the proof is going to progress.

c) *The learning aim*
The insightful mastery of the new concept (opposite angles) as well as the specific solution method (proof of the statement) is the child's *learning aim.*

d) *The lesson aim*
The lesson aim is realized in the course of the lesson. The essence of the matter as made visible to the child in the learning aim is the basis of the didactic design. The lesson aim as it has acquired form in the didactic design thus embraces the anticipated form of the lesson as well as the planned the didactic modalities.

To reach the essence of this proposition regarding opposite angles and as manifested in the reduction steps the lesson aim must embrace the following:

I. Unlocking the essential of the concept "opposite angles"

        Theory   Example