

EXPERIENCING MATHEMATICS - A PROGRAM  
FOR SLOW-LEARNING SEVENTH GRADERS

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Many persons, more expert than I, have presented pros and cons on the subject of grouping. I shall not enter this debate. However, as an instructional supervisor who renders services and support to classroom teachers and assists them in maximizing their efficiency in meeting the individual needs of their students, I rendered my support in favor of grouping. The teachers of junior high school mathematics in the Dade County, Florida, public schools strongly voiced a need for a different curriculum organization, especially at the Grade VII level. The opposed organization included two groupings for instruction: a group of students recommended by feeder elementary schools for accelerated mathematics instruction, and a group not recommended for accelerated mathematics. Criteria that included standardized tests scores, arithmetic grades and recommendations by elementary school principals determined placement in classes for acceleration. For the most part, the group of "not recommended" students was randomly assigned in groups of 35 for instruction. Herein arose our problem. Many students and teachers faced failure. Too often the range in mathematical maturity frustrated and overwhelmed the most dedicated teacher. When newer texts began appearing on the market reflecting innovations in mathematics instruction at the pre-college levels, many of our teachers envisioned this answer: teach the mathematically talented the "new math", and teach traditional Grade VII mathematics to the others. This, of course, was doomed for failure. Finally, during the spring of 1965, it became administratively possible to provide four levels of instruction in the junior high school.

Mathematical maturity of students for these three levels could be spelled out. Teachers could also be provided with commercially produced instructional materials. But for our lowest level - Level 1 - appropriate instructional materials could not be located. In addition most of our junior high school teachers were not equipped to teach the arithmetic of the elementary grades. With the grouping of pupils who needed such basic instruction, the inadequacies of our teachers would become painfully obvious. Therefore, an NDEA grant was secured to

- develop instructional materials for Grade VII students who score at least below the tenth percentile on standardized tests;
- produce a television series for inservice training of teachers in teaching basic arithmetic.

This grant made possible the writing of the book *Experiencing Mathematics* during the summer of 1965. How, in reality, did this book evolve?

The team assigned to this task consisted of three secondary and three elementary teachers. The chairman was in contact with many of the team members during the spring of 1965. They had to establish some basic assumptions and arrive at a working philosophy. The work was dictated by these assumptions:

1. Mathematical retardation is not necessarily controlled by the economic conditions of the pupils' families.

2. Negative attitudes about mathematics and about probable success in this area will predominate.
3. Developmental activities (experiences for induction) must appeal to the social, emotional and chronological maturity of the pupils as well as to their mathematical maturity.
4. Pupil involvement and responsibility for self-enhancement can be maximized.
5. Short, purposeful and distributed drill activities are important fixatives.
6. Instructional time devoted to development of understandings and concepts should not outweigh instructional time devoted to drill.

Before a page was written, this team (a) identified pupils who would qualify for placement on Level 1; (b) administered diagnostic tests during the summer of 1965 to Level 1 students enrolled in summer school (care was taken to diagnose mathematical achievement of a sample that would realistically reflect the economic stratification of students who would be grouped together during the regular academic year); (c) analyzed the above data and other data supplied by the county testing program to ascertain areas of greatest deficiency; and (d) critiqued the sequence of arithmetic learnings to determine what reorganization, if any, was needed.

As a result of this background information, the team decided to prepare instructional materials that would provide opportunities for positive changes in attitudes, support teachers in their attempts to guide these students in "learning to learn", and reorganize the use of instructional time so that students could have a longer time exposure to rational members.

(Comment: From our study, we were not sure of the reasons that made many students with average and above intelligence score low on achievement tests. Was it because of the seasonal arrangement of arithmetic instruction, particularly in Grades IV to VI, namely - fall - add and subtract whole numbers; winter - multiply and maybe divide whole numbers; spring - make sure they pass all diagnostic tests on operations on whole numbers before introducing fractions; school is almost out so fractions should be introduced!?)

Now, what changes were incorporated in *Experiencing Mathematics*?

"Let's Talk" - teacher-directed activities that involve conversations with two characters - Alpha and Beta were created to guide students in talking about their learnings and in abstracting worthwhile generalizations. Many students in this population have language problems. They cannot look at an example or participate in an activity and see relationships. This skill, if we can call it that, must be developed. These students often fail to ask questions, simply because they perceived nothing about which to question. The dialogues between Alpha and Beta raise questions that the student might ask, and direct attention to specific relationships from which valid generalizations may be drawn. All "Let's Talk" sections are designed to reveal to the teacher the

depth of pupil understanding. We conceive of this phase as analogous to the physician's case history work-up. The patient talks, he describes his complaints and relates the history of illnesses of his close relatives. From this, the physician gets cues on how he is to proceed. Similarly, the teacher should be cued into determining the nature and kind of additional experiences needed.

The organization of the text permitted a reversal in using instructional time. We begin with the set of non-negative rationals and attempt to create a sense of operational consistency between (a) operations on rational numbers in rational form, (b) operations on rational numbers in decimal notation, and (c) operations on rational numbers named as whole numbers.

The order of development is minutely sequenced with respect to skills and understandings these students bring to Grade VII.

Students are encouraged to determine for themselves from the algorithms presented the ones with which they feel most comfortable. This is by no means an innovation, since most recent texts include algorithms other than standard algorithms. However, we are deliberately encouraging teachers to accept the differences in children. This is extended to include acceptance of good non-standard algorithms. Simply because an algorithm can be concisely recorded does not mean that it is the easiest way for all children.

Teachers in 35 of Dade County's 42 junior high schools submitted these evaluations of *Experiencing Mathematics*:

1. Does this text appeal to the student for which it was intended?

Partially	5
Yes	27
No	3

2. What are the strengths of this text?

- Charts, illustrations, visuals, and patterns.
- Sequence of topics - development of concepts.
- Working in the book.
- Variety in practice problems.
- Simplicity of material and presentation.
- Readability.
- Written on a very elementary level with appeal to these older children.
- Multiple methods presented.
- Dialogues between Alpha and Beta.

*Experiencing Mathematics*: Our ideas and philosophy have been tested. They appear to have value. We have attempted to build concepts from the ground up and win children to learning mathematics. Our level organization provides opportunity for greater individualization of instruction. Students are not only being taught on their achievement level, they are also finding their comfort level. With these divisions, we divided to conquer!