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ABSTRACT

This newsletter summarizes findings from research on elementary school mathematics published during 1972 that might be used by teachers. Covered is research on addition and subtraction sentences, algorithms, problem solving, instructional materials, teacher questioning patterns, cognitive levels, instructional sequences, motivation, and logic. Announcements of a metric conference and a metrication project are included in a "News Notes" section. (DT)

SMEAC [illegible]
NEWSLETTER
AN ERIC CENTER
[illegible] Education — Volume 5, Number 2

Research on Elementary School Mathematics, 1972

Among the research studies reported each year, there are attempts to provide answers to some of the questions which both classroom teachers and other mathematics educators have about the teaching of elementary school mathematics. Suydam and Weaver (1970, 1971) and Suydam (1972) have summarized previous research: this newsletter presents some of the findings from research published during 1972. The focus is on research that the teacher might find useful: that is, research whose findings might be applied in the classroom. Other studies, of more specific information to researchers, are not included.* As this bulletin was prepared, the variability in the quality of research was taken into consideration, as well as its applicability.

Addition and Subtraction Sentences: What Needs Emphasis?

In the previous bulletin in this series (Suydam, 1972), three research studies on addition and subtraction sentences were reported. Engle and Lerch (1971) found that first graders who had studied in programs without emphasis on closed number sentences could make decisions about basic addition facts stated as either true or false number sentences with a high degree of accuracy. Weaver (1971) reported that sentences of the form $\square - b = c$ or $c = \square - b$ were significantly more difficult than were sentences of the form $\square + b = c$ or $c = \square + b$ for children in grades 1 through 3. Steffe and Johnson (1971) found that problems of the form $a + b = \square$ were easier than problems of the form $a - b = \square$, $a + \square = c$, and $\square + b = c$.

Additional exploration on mathematical sentences was reported in 1972. **Grouws** gave an oral test in which 32 third graders were each asked to solve 16 open sentences of the form $N + a = b$, $a + N = b$, $a - N = b$, and $N - a = b$. Open sentences of the $N - a = b$ type (e.g., $N - 19 = 46$) were significantly more difficult than the other three types. Sentences using basic facts with sums between 10 and 18 were significantly easier for third graders than similar open sentences using addends and sums between 20 and 100. There were no significant differences when some open sentences were presented in a verbal problem. Children used an average of five different solution methods, such as tallying, recall, counting, inverse relationship, and substitution, but high performance was associated with direct addition or subtraction.

It seems apparent that teachers need to give more attention to sentences of the form N a b. And more attention should be given to open sentences of all four forms where larger whole numbers are involved.

Mathematics programs for young children commonly provide experiences with open addition and subtraction sentences which have a solution within the set of whole numbers. Rarely, however, is explicit attention given to sentences such as $\square + 9$ 6 or 7 $\square$ 11, each of which has no solution within the set of the whole numbers. **Weaver** collected some evidence on how well first-, second-, and third-grade pupils recognize such "no solution" situations. Test data from 23 classes were presented.

Mean correct responses for open "no solution" addition sentences ranged from 40.8 per cent in grade 1 to 53.6 per cent in grade 2 to 61.3 per cent in grade 3. Performance levels at each grade were not the same for all open-sentence forms, but there was progressively less difference among these performance levels as grade level increased.

For open "no solution" subtraction sentences, the mean per cent of correct responses was essentially the same from grade to grade: 41.6 per cent for grade 1, 41.7 per cent for grade 2, and 41.9 per cent for grade 3. For both open addition and open subtraction sentences, the mean per cent of incorrect use of the "no solution" response decreased from grade to grade, reflecting the progressive improvement in performance.

Thus pupils were not at a complete loss in responding to open addition and subtraction sentences involving the untaught condition of no solution within the set of whole numbers. The ability to identify the "no solution" response was a variable phenomenon associated with such factors as grade level and sentence form. Weaver pointed out that some pupils erroneously assume that subtraction of whole numbers is commutative, and that teachers need to call attention to the **non**-commutativity of subtraction. Emphasis also needs to be given to reading number sentences in left-to-right order. And, rather obviously, instruction on open addition and subtraction sentences which have no solution in the set of whole numbers is needed.

† Prepared by Marilyn N. Suydam, Faculty Research Associate, ERIC/SMEAC

Division: Which Algorithm Is Advantageous?

Previous research (Suydam and Weaver, 1970) has identified instructional advantages for various division algorithms. The method of teaching, rather than the algorithm itself, seems to be the key: the division algorithm which is taught with the greatest degree of meaning has tended to lead to higher achievement.

Kratzer prepared two instructional units, both involving meaningful instruction. One used the distributive algorithm and the other used the subtractive algorithm, each as a method of keeping records of manipulating bundles of sticks. Three fourth-grade classes were each taught one of the division approaches. No significant differences in the approaches was found on achievement of familiar problems on immediate or retention tests. There was, however, a significant difference between the approaches on achievement of unfamiliar problems on both types of test: the distributive approach group displayed a better understanding of the process.

Rousseau undertook an experiment with twelve fourth-grade classes to determine whether or not the foundations on which a division algorithm could be built affect children's ability to retain and transfer on tasks involving the algorithm. Four algorithms were developed on these foundations: (1) mathematical, based on the distributive property of division over addition; (2) real-world, based on the physical act of "quotitioning;" (3) real-world, based on the physical act of partitioning; and (4) rote, based on the memorization of routines. No significant differences in retention of algorithms were found. For extensions to cases of slightly greater difficulty, the rote algorithm was superior. For problems of greater difficulty, however, the quotitive and distributive algorithms were better than the rote and partitive algorithms.

Problems: What Approach Helps?

Verbal problem-solving continues to draw the attention of researchers. In one study comparing the effects of three approaches, **Jerman** reported no significant differences between fifth-grade groups using a general-problem-solving program, a wanted-given program, or the regular textbook. Some effect on strategies, especially for the wanted-given approach, was noted. Jerman pointed out the dependence of problem-solving skill on computational ability. Perhaps we cannot expect students to solve more problems correctly unless we place emphasis on the required computational skills along with the problem-solving strategies.

Materials: What Helps Whom?

Research on the use of materials continues to indicate that the use of materials is very important, but that we need to consider carefully what, when, how, and by whom they are used. What outcomes are to be expected must also be considered.

McLaughlin found that pupils in grades 2 and 4 were able to reproduce behavior on a multiple-classification block task which they had seen demonstrated; only sixth graders, however, could transfer the information to a different but structurally similar task. Both "model" and "trial-and-error practice" conditions produced similar performance, but the "model" condition had a greater effect on pupils' knowledge about the relationships of the objects involved in the classification.

In a study in which various types of materials were used, **Wheeler** analyzed the relationship of the child's performance in solving two-digit addition and subtraction examples on four concrete embodiments and two-digit and multi-digit addition and subtraction examples in the symbolic mode. He tested the performance of 144 second graders on the use of the abacus, bundling sticks, the place value chart, and multi-base arithmetic blocks, and then gave them two-digit and multi-digit addition and subtraction examples in written form. There were no significant differences between the means of the children, at any of three levels of abstraction for regrouping, in solving two-digit examples in the symbolic mode. However, children proficient in regrouping two-digit examples on three or four embodiments scored significantly higher on the multi-digit written tests than children who were not proficient using the concrete materials, across all IQ levels. Significant correlations were found between the number of embodiments children were able to regroup for two-digit examples and achievement on the multi-digit tests.

It was concluded that children proficient in regrouping two-digit addition and subtraction examples on three or more concrete embodiments possess a significantly higher level of understanding of the regrouping concept than children without this proficiency with the concrete aids. This supports the multiple embodiment hypothesis that concept formation is facilitated through the use of a variety of materials.

As has also been found in some previous research, **Clausen** reported that kindergarten and first grade pupils exposed to a multi-sensory approach achieved higher than pupils using a worksheet-textbook approach.

Questions: What Kind Are Needed?

Many recent studies have explored the type and quality of various classroom behaviors. **Meckes** studied teacher-pupil interaction and teachers' questioning patterns for mathematics classes in grade 6. A tape recording was made of one class session conducted by each of 100 teachers, and ten-minute segments of the tape were analyzed. All teacher-questions were also transcribed and categorized. Results indicated that the role of the mathematics teacher has not changed from that of giving information to that of guiding learning experiences. This conclusion was supported by the following evidence: The teacher spent 61.5 per cent of the time talking. Direct influence accounted for 50.2 per cent of the teacher talk. Although indirect influence amounted to 49.8 per cent of the teacher talk, the largest portion of this was in the questioning category. And since most of these questions were very narrow, they provided little opportunity for students to express their own ideas.

The intent of the new mathematics programs and present classroom practices were also shown to be inconsistent. Although one of the primary objectives of the new mathematics is to foster a spirit of inquiry and to develop creativity, only .5 per cent of the total questions were placed in the synthesis category. The two low cognitive level categories accounted for 79.5 per cent of the questions asked.

The need for teachers to develop questioning at the high cognitive levels is evident.

The use of questions was also found in connection with an experimental study. **Nichols** found that first-grade child-

ren who had to respond orally to three questions about why they answered correctly took fewer trials to reach criterion on number conservation tasks than did children who did not answer questions following correct responses. Her three questions: "Why? How do you know? Can you tell me more?" Teachers can readily apply these in many classroom situations.

Burron examined the assumption that all children of various abilities can profit from instruction at a variety of cognitive levels. Five process exercises were developed, comprised of mathematical tasks designed to elicit responses at a variety of levels. Data were then collected from two groups of approximately 40 sixth-grade pupils each, who had been selected as having high or low success-potential. Significant differences favored the high group for every cognitive level except "data-generation." The proportion of pupils functioning successfully within each group increased as cognitive level ascended, but ability to function successfully at a given cognitive level was neither discrete or consistent with group membership. At least half of the low group attained "a respectable measure of success" at every cognitive level.

Burron concluded that differences in the ability to function successfully at a variety of cognitive levels seemed more related to the level of complexity of a task than to cognitive level. Challenging **all** pupils to stretch their modes of thinking on a variety of cognitive levels seems to be a valid educational objective. Differences in individual cognitive styles imply tasks structured to include a large domain of possibilities, alternatives, and opportunities to achieve goals in a multiplicity of ways.

In the study, a marked difference in behavior related to self-confidence was also noted. Pupils in the low group seemed hesitant, threatened, or reluctant to respond to divergent questions, while high-group pupils displayed little of this behavior. Pupils in both groups showed preference for manipulatory activities; non-manipulatory tasks evoked a drop in interest and enthusiasm among the low-group pupils, while high-group pupils were able to sustain activity.

In another study dealing with cognitive levels, **Callahan and Passi** examined three series of elementary-school mathematics textbooks, two contemporary and one "premodern," for grades 3-6. Instances were noted of the occurrence of seven cognitive levels: knowing, translating, manipulating, choosing, analyzing, synthesizing, and evaluation. More than half of the cognitive activities found in the series were classified at the "manipulating" level. Few activities were classified as "translating." Newer series had more "knowing" items than the older series did. Little was done at the three high cognitive levels. It would appear that much supplementing of the textbook by the teacher needs to be done, so that children are asked questions and given activities at all cognitive levels.

Buchanan examined instructional sequences to determine how prior experience with subordinate tasks affected mastery of a superordinate task, and the efficiency of performance within a sequence. In Experiment I, 72 fifth-graders used paired-associate-type cards for problems in modulo 12. In Experiment II, 120 sixth graders used an instructional program on set-union. The amount of prior experience with the introductory task had a significant effect on mastery of the superordinate task.

In Experiment I, the number of errors and learning trials on the task increased significantly with increasing amount of prior experience, not entirely independent of presentation order. The transfer task in Experiment II indicated that prior experience with the introductory task inhibited the performance of low-aptitude students.

Phillips developed and evaluated procedures for validating a learning hierarchy from test data. A test to assess mastery at each of 11 levels of a hierarchy for computational skills of adding rational numbers with like denominators was administered and seven hierarchical orderings of the 11 subtasks were generated. One programmed instruction lesson was developed for each subtask. Fourth-grade pupils were assigned to seven groups defined by the hierarchical orderings. Results indicated that sequence, even if random, seemed to have little effect on immediate achievement and transfer to a similar task. However, longer term retention seemed quite susceptable to sequence manipulation.

In one of a set of studies, **Sawada** studied a strategy for organizing a curriculum into a mathematically-cast system with explicit structural mediators of positive transfer from lower- to higher-order objectives. Three axioms were specified in mathematical form such that the system was characterized by composition and reversibility. Eleven instructional sequences were presented via computer-assisted instruction. It was found that performance on an objective had little relationship with performance on the inverse objective. Pupils on their own apparently did not pick up the strategy of forming composites. In other words, pupils did not seem aware of reversibility inherent in the materials, nor of composition objectives. The need for explicit teaching, rather than expecting transfer to occur as a by-product, is indicated.

Rea and French reported on a small-scale research study with a class of sixth graders. One group used mental computation exercises; the other was given enrichment activities using the same content. Tests were given on the first and twenty-fifth days, with 24 instructional periods intervening in which both groups received their regular mathematics period **plus** 15 minutes daily of the special activities.

As the authors point out, in both groups were individuals whose scores increased only slightly, and scores even decreased for a few. However, in both groups, the majority of the students gained rather dramatically; the average gain for the enrichment group on the achievement test was one full year, and for the mental computation group was eight months.

While the study is subject to many limitations, the increase in achievement scores seems to be worth pursuing, both in more rigorously designed experiments and in classroom situations where a similar set of experiences may be desirable. There can be little doubt that the results were influenced by factors such as the halo effect, which often accompanies enthusiastic experimentation. But why not capitalize on this in the classroom? Children do like variety —and children enjoy experimenting and being part of an experiment. Research is a way of motivating children.

Schultz studied some factors related to motivation: the combined influence of teacher facilitative behavior and the

effect of interpersonal compatibility between teacher and student. Each of 20 tutors was assigned one student who appeared most compatible and one student least compatible to him, determined by responses to a test on interpersonal relationships. Student increases in achievement and in self-concept of arithmetic ability after nine tutoring sessions did not appear to be related to tutor predisposition of facilitative behavior and/or degree of interpersonal compatibility between tutor and student. However, when compatibility was present, students rated their relationships with tutors as more facilitative.

Sheppard studied one aspect of the development of concept learning: the concept was a two-attribute, conjunctive, non-verbal one about right triangles. Two groups of 40 fifth graders were tested individually. Each saw one example and three non-examples. Giving divergent examples was found to be better than giving convergent examples; giving matched non-examples was better than giving non-matched non-examples. The combination of divergent examples and matched non-examples yielded predominantly correct classification behavior. Other combinations resulted in either over- or under-generalization—or confusion.

Fetzer gave 27 logic problems differing in content and validity to 206 students aged 8 through 15. Problems involving conflict were found to be more difficult than corresponding agreement and neutral forms. Those involving invalid assumptions were found to be more difficult than those having validity. In general, younger children appeared to base their judgments on the empirical conditions and did well on problems where the logical and empirical cues agreed, whereas older children were able to disregard the empirical content and base their judgments on the logical structure of the problem. Thus young children may appear to be responding to the logical structure of a problem when in fact they are responding merely to the truth of the empirical content.

* A complete annotated listing of studies published during 1972 is available from ERIC/SMEAC. The listing will also appear in the November 1973 issue of the **Journal for Research in Mathematics Education.**

List of Selected References**

Buchanan, Aaron Dean. An Experimental Study of Relationships Between Mastery of a Superordinate Mathematical Task and Prior Experience with a Special Case. (University of Washington, 1971.) *DAI* 32A: 6091; May 1972.

Burron, Douglas Stuart. The Ability of Selected Sixth Grade Pupils to Function at a Variety of Cognitive Levels on Selected Mathematical Tasks. (University of Northern Colorado, 1971.) *DAI* 32A: 3775-3776; January 1972.

Callahan, LeRoy and Passi, Sneh Lata. Textbooks, Transitions, and Transplants. *Arithmetic Teacher* 19: 381-385; May 1972.

Clausen, Thomas Greenwood. A Developmental Study of Children's Responses to Multi-Sensory Approach in Mathematics. (University of Southern Mississippi, 1971.) *DAI* 32A: 4830; March 1972.

Engle, Carol D. and Lerch, Harold H. A Comparison of First-Grade Children's Abilities on Two Types of Arithmetical Practice Exercises. *School Science and Mathematics* 71: 327-334; April 1971.

Fetzer, Margaret Keenen. The Development of Syllogistic Reasoning. (University of Delaware, 1972.) *DAI* 33A: 1018; September 1972.

Grouws, Douglas A. Open Sentences: Some Instructional Considerations from Research. *Arithmetic Teacher* 19: 595-599; November 1972.

Jerman, Max Edward. Problem Solving in Arithmetic as Transfer From a Productive Thinking Program. (Stanford University, 1971.) *DAI* 32A: 5671; April 1972.

Kratzer, Richard Oren. A Comparison of Initially Teaching Division Employing the Distributive and Greenwood Algorithm with the Aid of a Manipulative Material. (New York University, 1971.) *DAI* 32A: 5672; April 1972.

McLaughlin, Lynn Mary James. Age and Observational Learning of a Multiple Classification Task. (St. Louis University, 1972.) *DAI* 33B: 1271; September 1972.

Meeks, Richard C. A Study to Ascertain the Instructional Index and Questioning Strategy of Mathematics Teachers in Grade 6, and to Determine Their Relationship to Professional Characteristics and Situational Factors. (Southern Illinois University, 1971.) *DAI* 32A: 4245-4246; February 1972.

Nichols, Lois K. Language as a Facilitating Factor in the Ability to Achieve Conservation of Number. (State University of New York at Albany, 1972.) *DAI* 33A: 2822; December 1972.

Phillips, Ernest Ray. Validating Learning Hierarchies for Sequencing Mathematical Tasks. (Purdue University, 1971.) *DAI* 32A: 4249; February 1972.

Rea, Robert E. and French, James. Payoff in Increased Instructional Time and Enrichment Activities. *Arithmetic Teacher* 19: 663-668; December 1972.

Rousseau, Leon Antonio. The Relationship Between Selected Mathematical Concepts and Retention and Transfer Skills with Respect to Long Division Algorithms. (Washington State University, 1972.) *DAI* 32A: 6750; June 1972.

Sawada, Daiyo. Toward a Theory of Sequencing: Study 3-1: Curriculum Hierarchies and the Structure of Intelligence: A Strategy of Organizing Instructional Objectives into Mathematical Systems Employing Basic Piagetian Constructs. (The Pennsylvania State University, 1971.) *DAI* 2A: 6221-6222; May 1972.

Schultz, Edward W. The Influence of Teacher Behavior and Dyad Compatibility on Clinical Gains in Arithmetic Tutoring. *Journal for Research in Mathematics Education* 3: 33-41; January 1972.

Sheppard, Allan Noel. Changing Learner Conceptual Behavior Through the Selective Use of Positive and Negative Examples. (Indiana University, 1971.) *DAI* 32A: 4496; February 1972.

Steffe, Leslie P. and Johnson, David C. Problem-Solving Performances of First-Grade Children. *Journal for Research in Mathematics Education* 2: 50-64; January 1971.

Suydam, Marilyn N. From the Research of 1971 on Elementary School Mathematics. In Mathematics Education Newsletter, Volume 3. Columbus, Ohio: ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, The Ohio State University, 1972.

Suydam, Marilyn N. and Weaver, J. Fred. *Using Research: A Key to Elementary School Mathematics.* University Park, Pennsylvania: The Pennsylvania State University, 1970.

Suydam, Marilyn N. and Weaver, J. Fred. The Research from 1970: What Did It Add? Columbus, Ohio: ERIC Information Analysis Center for Science and Mathematics Education, The Ohio State University, February 1971.

Weaver, J. Fred. Some Factors Associated with Pupils' Performance Levels on Simple Open Addition and Subtraction Sentences. *Arithmetic Teacher* 18: 513-519; November 1971.

Weaver, J. F. The Ability of First-, Second-, and Third-Grade Pupils to Identify Open Addition and Subtraction Sentences for Which No Solution Exists Within the Set of Whole Numbers. *School Science and Mathematics* 72: 679-691; November 1972.

Wheeler, Larry Eugene. The Relationship of Multiple Embodiments of the Regrouping Concept to Children's Performance in Solving Multi-digit Addition and Subtraction Examples. (Indiana University, 1971.) *DAI* 32A: 4260; February 1972.

**"DAI" refers to *Dissertation Abstracts International.*

These documents are some of those announced in Research in Education during April or May 1973.

SE 015 509

ED 071 879
Sixth Grade Mathematics. A Needs Assessment Report.
Texas Education Agency, Austin. Div. of Program Planning and Needs Assessment.
Pub Date 72
Note—132p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Academic Performance, Educational Objectives, *Elementary School Mathematics, Grade 6, *Mathematics Education, *Objectives, *Student Evaluation, Student Testing, *Testing Programs
The Prescriptive Mathematics Inventory (PMI)-Level B and a Pupil Identification Form (PID) were administered to 22,055 sixth graders in Texas. Results from the PMI are reported in terms of the percentage of students marking the correct response for each of 209 objectives. Panels of mathematics teachers and of mathematics experts rated 40 of these objectives as "basic"; this report summarizes the basic objectives and gives the percentage of sixth graders mastering the objective as shown by the PMI. In addition, students' performance on each of the 209 objectives was analyzed on the basis of pupil characteristics obtained through the PID and according to the characteristics of the schools they attended. Results showed wide variations in achievement of objectives, for each objective, wide variations in performance were found among pupils of various ethnic groups, among students of schools serving communities of various sizes and types, and between pupils having high and low educational emphasis at home. Possible uses for this report are suggested. (Author/DT)

ED 071 878 SE 015 508
Briggs, John W.
Idaho Curriculum Guide in Mathematics K-12.
Idaho State Dept. of Education, Boise. Div. of Instruction.
Pub Date Sep 70
Note—331p.
EDRS Price MF-$0.65 HC-$13.16
Descriptors—*Behavioral Objectives, Curriculum, *Curriculum Guides, *Elementary School Mathematics, *Instruction, *Mathematics Education, Secondary School Mathematics, Teaching Techniques
The content of this guide has been organized under five major topics: number and operations, sets, functions, relations, systems, and logic, geometry, measurement and estimation, and selected topics. A scope and sequence chart is given for each of the topics for grades K-12. Behavioral objectives, teaching aids and suggestions are listed for each of the topics at every grade level from K-8. A list of 17 references on problem solving is included. (DT)

ED 070 656 SE 015 465
Harvey, John G.
The Content of Arithmetic Included in a Modern Elementary Mathematics Program.
Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
Spons Agency—National Center for Educational Research and Development (DHEW/OE), Washington, D.C.
Bureau No—BR-5-0216
Pub Date Oct 71
Contract—OEC-6-10-154
Note—45p.; Working Paper No. 79
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Arithmetic, *Curriculum Development, *Elementary School Mathematics, Geometric Concepts, *Instruction, *Mathematics Education, Number Concepts, Program Descriptions
Identifiers—Number Operations
Details of arithmetic topics proposed for inclusion in a modern elementary mathematics program and a rationale for the selection of these topics are given. The sequencing of the topics is discussed. (Author/DT)

ED 070 026 CG 007 712
Lewin, Karen S.
The Relationship of Sex of Teacher and Father Presence-Absence to Academic Achievement.
Institute for Juvenile Research, Chicago, Ill.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Bureau No—BR-1-E-105
Pub Date Aug 72
Grant—OEG-5-71-0045(509)
Note—125p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Academic Achievement, *Elementary School Students, Elementary School Teachers, *Fathers, Language Instruction, Mathematics, Parent Child Relationship, *Parent Role, Parents, Reading Achievement, *Student Teacher Relationship, Teachers
This report contains the findings of five specific hypotheses which were tested concerning the relationship of sex of teacher, sex of child and extent of father presence to academic achievement. Residual change scores in mathematics, reading, and language were subjected to regression analyses and three way analyses of variance. The subjects in the study were 201 girls and 218 boys in the fourth and fifth grade classrooms of 14 male and 14 female teachers. The measures of extent of father presence-absence came from mothers' responses to a father activity inventory. The analyses generally indicated that none of the independent variables were related to the achievement scores. The report states that future research should consider intervention at an earlier age, quality of father presence, teacher quality, and developmental sex differences. (WS/Author)

ED 071 918 SE 015 640
Greenwood, Jonathan
Resources for Individualizing Mathematics.
Oregon State Dept. of Education, Salem.
Pub Date [73]
Note—26p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Activity Learning, *Annotated Bibliographies, Evaluation, *Individualized Instruction, Instruction, *Instructional Materials, Laboratory Procedures, Manipulative Materials, *Mathematics Education, Objectives
The process of establishing an individualized mathematics program is discussed. An annotated list of references covering program and course goals and objectives, diagnostic and achievement tests, teacher reference books, and activity sources is provided. Twenty-one articles from "The Arithmetic Teacher" which offer a rationale for the activity approach and which suggest suitable activities are also listed. Addresses are provided for 16 commercially produced activity cards and packages and for 15 sources of mathematics laboratory equipment, games, and enrichment materials. (DT)

ED 071 870 SE 015 453
Lowry, William C., Ed.
The Slow Learner in Mathematics. NCTM Yearbook 35.
National Council of Teachers of Mathematics, Inc., Washington, D.C.
Pub Date 72
Note—528p.
Available from—National Council of Teachers of Mathematics, 1201 Sixteenth Street, N.W., Washington, D.C. 20036 ($8.50; $7.50 for NCTM members)
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Activity Learning, *Curriculum, *Instruction, Instructional Materials, Laboratory Procedures, *Mathematics Education, Objectives, *Slow Learners, Teacher Education, Teaching Methods
The first part of this yearbook treats the characteristics and needs of the slow learner, the research literature behavioral objectives, and the creation of a favorable learning environment. The second part, meant to provide more specific help for the classroom teacher, deals with teaching techniques, multisensory aids and activities, mathematics laboratories, and diagnostic-prescriptive procedures. The third part covers classroom management and school administration curriculum for slow learners, and program descriptions for in-service teacher education. Two appendices present activities, games, applications, and sample lessons that have been found to be effective with slow learners. (Author/DT)

News Notes

Listing of Journals

The External Affairs Committee of the National Council of Teachers of Mathematics has compiled a "Listing of Foreign and Domestic Journals in Mathematics Education." The "Listing" gives titles and addresses for various foreign and domestic journals as well as, where possible, an indication of education level(s) dealt with in journal articles. The journals are concerned with topics in mathematical education, as opposed to pure mathematics and as opposed to general education. Persons interested in having a copy of the "Listing" should request one (postcard or letter) by writing to: **Listing Request,** National Council of Teachers of Mathematics, 1906 Association Drive, Reston, Virginia 22091.

Correction . . .

The single copy price for **Current Index to Journals in Education** is $3.70 (not $3.50 as listed in the last Newsletter).

Emphasis: Metrication

A **metric conference and exhibit,** "Going Metric: Meeting the Conversion Challenge," is scheduled for September 7-8, 1973, on the UCLA campus. The conference is designed to aid industry in its plans for making the metric conversion and to speed up the public's understanding and acceptance of the metric system. A highlight for teachers will be a credit-giving metric workshop. For further information on the conference, contact: Mrs. Valerie Antoine, 10245 Andasol Avenue, Northridge, California 91324.

The **Toll Gate Metrication Project** is an educational experiment for elementary through junior college students, aimed at implementing change toward adoption of the metric system. The project is financed by an ESEA Title III Minigrant through the Rhode Island State Department of Education. Project findings and recommendations will be made available in the summer of 1973. Anyone wishing to receive information should send a self-addressed and stamped envelope to: John Izzi, Director, Toll Gate Metrication Project, Toll Gate Education Complex, Warwick, Rhode Island 02886.