This annotated bibliography announces journal articles, dissertations, and other documents related to science and mathematics for young children. The documents cited are expected to be useful to teachers, curriculum developers, and research personnel. The bibliography updates, but does not replace a bibliography published in September, 1969, (ED 033 259). The majority of the entries concern science, and are classified under the following headings: General topics, Activities (descriptions of activities of interest to young children), Classification, Concepts, Conservation (developmental psychology), Curriculum, Discrimination (auditory and visual), Goals, Headstart, Materials, Montessori, Perception, Piaget, and Problem Solving. In these subsections, and in the Mathematics section, research reports, program descriptions, and accounts of developmental trials are included. Brief annotations describe the contents of the document or the principal research findings. Journals which have had special issues related to science and mathematics for young children are included in a special listing. (AL)
SPECIAL BIBLIOGRAPHY SERIES
BIBLIOGRAPHY 4

SCIENCE AND MATHEMATICS FOR YOUNG CHILDREN:
AN ANNOTATED BIBLIOGRAPHY

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SPECIAL BIBLIOGRAPHY SERIES
BIBLIOGRAPHY 4

SCIENCE AND MATHEMATICS FOR YOUNG CHILDREN:
AN ANNOTATED BIBLIOGRAPHY

By Frances Case Theiss
San Jose Unified School District
San Jose, California

ERIC Information Analysis Center for Science
and Mathematics Education
1460 West Lane Avenue
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August, 1970
The Science and Mathematics Education Information Reports are being developed to disseminate information concerning documents analyzed at the ERIC Information Analysis Center for Science and Mathematics Education. The reports include three types of publications. Special Bibliographies are being developed to announce availability of documents in selected interest areas. These bibliographies will list most significant documents that have been published in the interest area. Guides to Resource Literature for Science and Mathematics Teachers are bibliographies that identify references for the professional growth of teachers at all levels of science and mathematics teaching. Research Reviews will be issued to analyze and synthesize research related to science and mathematics education over a period of several years.

The Science and Mathematics Education Information Reports will be announced in the SMAC Newsletter as they become available.
PREFACE

Special Bibliography 4 announces journal articles, dissertations, and other publications related to the selected interest area: Science and Mathematics for Young Children. This annotated bibliography contains documents considered to be useful to teachers, curriculum developers, and research personnel.

Special Bibliography 4 is an update, not a replacement, of Special Bibliography 1, published in September, 1969. Therefore, some selected citations from Special Bibliography 1 plus appropriate recent documents, are contained in Special Bibliography 4.

Special Bibliography 1 (ED 033 259), and eventually Special Bibliography 4, can be ordered from ERIC Document Reproduction Service, 4936 Fairmont Avenue, Bethesda, Maryland 20014. Documents are available in both microfiche (MF) and hardcopy (HC). Be sure to indicate ED numbers and whether MF or HC is preferred.

Special interest requests received at the ERIC Center for Science and Mathematics Education determine the content of Special Bibliographies. Since these bibliographies are published according to areas of demand, your suggestions for topics to include in this series are welcomed.

Cassandra Balthaser
Editor
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I. SCIENCE

A. General Topics

Achievement


One finding: socio-economic background was not a predictor of success when non-verbal behavior was required.


One finding: significant differences between the means in favor of the experimental group in arithmetic occurred at the levels indicated.

Articulation


Discusses an articulated type of nursery-kindergarten program. Many suggested activities include science experiences.

Behavior


Task consisted of 3-step game which involved building with tinker toys, color and form matching, and choice of reward box. One implication of study: children will imitate other children of same age and sex in an experimental setting.

One conclusion: the effect of reward must be determined both for the recipient and for the non-recipients in a situation which has more potential for competitive motivation. G2 subjects used.


Purpose of study: to design a technique for collecting, scoring and evaluating scientific aspects of curiosity as expressed behaviorally by first grade children. Bibliography.

Bereiter


Dainton Report


A summary of the recommendations of the Dainton Report on science education in Britain is followed by two articles appraising the report and its impact on Briti... tools.


An analysis of the Dainton proposals and a listing of its recommendations.

Discovery Method

States that content comes from all areas of science. Skills of observation and development of the use of the senses are stressed. Discovery is emphasized.


A detailed discussion of the methodology of teaching by the discovery method.

Form Recognition


The finding of this study that young nursery school children are more likely to recognize a form if they manipulate it than if they merely inspect it visually is in general agreement with the literature.

Government in Education


Intellectual Skills


Purpose of Study: (1) to construct lessons in science designed to teach selected skills; (2) to develop group non-reading tests which would measure the growth of the intellectual skills of observation, classification, data treatment and measurement.


Using dimensions of form and texture, subjects in the 4-year range were found to achieve cross-modal dimensional learning (factual to visual) as readily as ipsi-modal dimensional learning (visual to visual).
Interdisciplinary Approach

Discusses methodology of discovery approach to science teaching. States that preschool science should be taught as an interrelated field and as an integrated part of child's school day.

Round-table discussion includes interdisciplinary programs for young children.

Kennedy Preschool Program

Analysis of Number Readiness variable shown to be significant in favor of Kennedy group. Study indicated positive relationship between length of preschool attendance and readiness for first grade.

Nurturance

Hypothesis I, that nurturance would lead to more persistence, was not supported; hypothesis II, that nurturance would lead to increased effectiveness, was partially supported.

Observation

One conclusion: performance of children in noting properties of, as well as experiences and associations with, plants can be improved with instruction.
Oxford Primary Science Project


Describes the establishment and purposes of a research project at the Oxford University Institute of Education to inquire into the formation of scientific concepts in young children.

Note: In British education, the term "young children" refers to the age group 5-13, which group attends "primary" schools; the hierarchy being: Infant schools, Junior schools, and Primary schools.

Plowden Report


Includes a complete detailed listing of all of the proposals of this report, which concerns the reform of nursery and primary education in Britain.


An editorial appraising the recommendations of the Plowden Report on primary education in Britain.

Probability Judgements


Two samples made probability judgements under two conditions: Piaget procedure and decision-making procedure. Results analyzer.

Readiness


States that experiences in science, in situations conducive to vocalizing, contribute toward making children language-ready for reading.

Science—Africa

Posits the belief that science instruction in the early years should proceed from the study of natural phenomena and through the asking of questions of nature.

Science—Australia


Science—Handicapped


Science—USSR

Nizova, A. M. "Natural History in the Primary Grades." Soviet Education 7:23-7. August, 1965. Outlines proposed natural science curriculum for G1, 2, 3. Emphasizes "those methods which are peculiar to the sciences of nature" being used during the study of nature.

Shatkin, I. N. "Tasks and Content of Primary Education." Soviet Education 7:30-5. January; 1965. "Teach the child to seek the answers to his questions in books and in science." Recommends greater amount of "scientific and geographic" knowledge be presented.
Sex Education

Child should be answered in clear, simple terms and told only as much as he is able to absorb.

Discusses a classroom incubation experiment to teach the concept that all living things come from other living things and eventually die.

Sex education should begin very early and be dealt with knowledgeably. Suggests activities for understanding of reproduction.

Skills

Results indicated that both instruction and practice treatments produced significant gains in puzzle-assembly skill.

Study and Teaching

Discusses growth and development, metabolism, reproduction, responsiveness, community, adaptation, change. A concise treatment, geared to those with little science background.

Hall, Gene Erwin, Ph.D. A Comparison of the Teaching Behaviors of Second Grade Teachers Teaching SCIENCE — A PROCESS APPROACH With Second Grade Teachers Not Teaching a Recently Developed Science Curriculum. Dissertation: Syracuse University, 1968. DA 29:2040-A.
One conclusion: biweekly visiting science consultants were more effective than in-service training during the school year.

Transfer of Learning

Conclusion: prior training in one sense modality did not affect learning-set formation in a second sense modality.

Mumbauer, Corinne C. and Richard D. Odum. "Variables Affecting the Performance of Preschool Children in Intradimensional, Reversal and Extradimensional Shifts." Journal of Experimental Psychology 75:180-7. 1967. Abstract: PA 41:06499. 144 preschool children were presented a transfer-of-discrimination task in which the variables were overt verbalizing, overtraining, dimension and shift. Dimension was found to interact with each of the other variables in determining transfer performance.

TV Instruction


B. Activities


Includes preschool and kindergarten activities for science and number readiness.
Note: "Early Education Guide" is a regular monthly feature of Grade Teacher.

Have children bring acorns, etc., to school and discuss them.

A pupil dramatization culminates a six-week G1 unit on toys involving experiences with five forces related to air, muscles, electricity, gravity and magnetism.

Describes activities using musical chairs, dolls and carriages and play-dough.

Discusses concepts and activities centered around outdoor observation of fall fruit. Includes supplemental activities in art, social studies, math and language arts.

Includes seven tested activities.

Describes a four-week summer animal study project for children of low socio-economic backgrounds.

Describes a candle-making activity as a natural way of introducing young children to some of the many changes which matter can undergo.
Describes a plan for creating individualized science lab lessons for K-3 readers.

Discusses reasons for planting procedure, conditions for optimum growth, etc.

The study investigates the influences of certain science experiences on the attainment of concrete operations by first grade children as revealed by selected Piagetian conservation tasks.

An outline of calendar-oriented Kindergarten science activities from October-June.

Describes successful first-grade science activities.

Describes a lesson which is part of a unit on "Investigating Systems."

Thoren, Winifred M. "Kindergarteners Make a Space Film." *Instructor* 79: January.
Describes a project connected with the Apollo flights.

Describes baby chicks hatching from their eggs in a Kindergarten classroom.

C. Classification

100 children judged which of two silhouettes was "more like" a third that was identical with one figure in color, to the other in shape.

Describes experiments with four-year-olds to explore certain parallels in the children’s ability to order and orient objects.


An investigation of 4-6 year old children’s understanding of the logic of classes and number. They could not understand the relation between classes and sub-classes.


Classificatory behavior seems to be preliminary and necessary for effective conceptualization to take place.


Findings of this study revealed a good representation of the directional properties of space at age 3-5.


Findings of this study support construction of a specialized curriculum for the teaching of classification abilities to children from low socio-economic backgrounds.

D. Concepts


Nonverbal evaluation techniques can be used to assist in the grade placement of science concepts at the primary grade level.


Evidence indicates that it is possible to create an objective, teacher-administrated, non-reading, group science mastery test. Illustrated.
Describes practical experiences to help primary children form concepts of area.

Discusses conceptualizing in science. Suggests activities.

A study of concept learning involving 72 nursery school children and 72 second graders.

One conclusion: extended periods of pre-kindergarten experience tend to produce higher levels of concept development than do preschool programs of a more limited duration.

Discusses Kindergarten plans centering on the child's cognitive functions. Gives extensive list of exercises designed to develop concept formation.

Hypothesized that 4 tasks employing dominoes to represent increasing levels of abstraction in the use of number terms and presented them to 38 3-8 year old Ss.

Survey showed that children need a working knowledge of relational terms if they are to respond correctly to directions and materials of all kinds.

Includes discussion of abilities and goals for young children.  
Bibliography.

Purpose of the study: to determine if children from three socio-economic groups differed in their understanding of selected science concepts and in the methods they would suggest to find answers to questions associated with the concepts. G3 subjects were used.


Data are presented relating to children's preferences for stimulus dimension (form, color and number) to performance on concept identification tasks involving preferred and non-preferred dimensions.


Includes discussion of concepts of grouping and diversity of living things which can be grouped by K and G1.


One finding: the Head Start Program results in an early mastery of selected science learning materials. The advantage is lost, however, in the absence of a follow-up program.


Evidence favoring the conceptual sequence: "momentum → conservation of matter → proportional use of mass and velocity → velocity" is presented. Bibliography. See DA 26:3762.


A series of anecdotes dealing with young children and their emerging scientific concepts.


Discusses a study to determine whether a process of stimulus reorganization or simple rote memory was more basic for learning in young children. Bibliography.

The study attempts to quantify the relationship between dimensional dominance and performance on a concept-shift learning task. Ss: 144 Kindergarten children.


Student teachers interview a sample of K-2 children to gather data on early levels of perception and scientific reasoning.


Describes a study to determine the capacity of children of Kindergarten age of varying abilities to develop mathematical concepts related to telling time.


Describes how experiences with classroom animals can teach primary-level concepts relating to life and death.

E. Conservation*


A study in which, with order and position influences controlled, the Mehler-Bever tasks and a 3rd "over conservation" task of similar form were administered to 74 2-4 - 5-9 year old Ss.


Provided 17 nonconserving kindergarteners with experiences which focused upon the conservation of continuous quantities in terms of the numeration and comparison of discrete units of liquid quantity.


In line with Piaget’s analysis of concrete operations the results of a test of 30 K-G3 children suggested a shift in orientation toward the problems occurring during G1 and G2.

*Those interested in Conservation should also check Piaget heading.
15

The subject of the study was the development of generalized conservation behavior in young children.

Results indicate that conservation of length was most difficult for Ss (55 6-9 year old children).

Deals with the ability of preschool children to use the relational terms "more," "same" and "less" when comparing the number, length and weight of objects.

Describes a study designed to test the hypothesis that selected experiences would enhance the ability of Kindergarten children to conserve numerosness. Extensive (38-entry) bibliography.

Describes results of training directed toward the multidimensional concept of "bigger" as administered to 20 children ranging in age from 5 1/2 to 7 1/2 years.

The study implies that the progress made by young children when taught to conserve amount by the Frank-Brunner screening method is unstable.

90 nursery school Ss, 100 Project Head Start Ss and 220 kindergarten Ss are trained with various number conservation techniques.

Reports the results of a study on 120 Kindergarten Ss of the efficacy of 4 training techniques for inducing the concept of conservation of substance.

Results of study indicate that young children's concept of time is surprisingly defective.


Data indicate that nonconservers think that an increase in a clay ball's temperature reduces its weight, and the converse. 120 G2 Ss used.


After a pretest for conservation of weight, 48 five to eight year old nonconservers were given one of four training treatments. The article describes results of the treatments.


One conclusion of study: conservation responding can be successfully taught via reversibility training.


Investigates certain methodological issues in current conservation of number assessment procedures.


Evaluated an approach to the training of conservation of number through the presentation of a logical sequence of component concepts or steps in a series of 3 experiments using 130 kindergarten children.


A modified technique for assessing the child's acquisition of length acquisition was designed and tested on 62 5-year-old subjects.


Two of the most basic theoretical constructs used by Piaget to explain the acquisition of conservation were identified, described, then tested for their ability to account for the child's performance on a test of conservation.
Tested the understanding of relational terminology and conservation of number in 66 2.7-6.1 year old Ss.

Describes and evaluates a test of conservation of numerousness administered to 341 children at the end of the first grade. Bibliography.

An investigation of the child's concept of number conservation and how it was affected by social interaction with other students on a conservation of number task.

Purpose of the study: to investigate whether certain sets, experimentally induced, could determine responses to conflict trials and to tests of conservation.

F. Curriculum

Describes the development of an evaluative instrument to be used by curriculum researchers to measure and compare attainment of the goals of K-3 science curriculums.

Chalmer, Freda Anne. The Effect of Selected Frostig Visual Perception Units on First Grade Children's Achievement on the Science Curriculum Improvement Study Unit MATERIAL OBJECTS. Dissertation: State University of New York at Buffalo, 1969. DA 30:2243-A. 
Evidence from this study indicates that there appears to be a variation among young children in perceptual development and such development seems to be related to performance in some school-related skills.

Includes a discussion of the role of the science curriculum in the full-day schedule.


"The need to teach concepts related to the regularities of time is fairly obvious — less obvious, however, is the need for specialized approaches which involve presenting these concepts to the lower class child in meaningful ways." Suggests activities.


"A premature emphasis on the teaching of traditional academic skills at the pre-school level is inconsistent with the necessity to foster each child’s creative potential."


The experimental program proved to be significantly more effective in promoting intellectual functioning, language abilities, perceptual development and school readiness.


Describes a two-year preschool program for disadvantaged children. Children in program experienced average IQ rise of 14.6 points over the two-year period compared to an average gain of 4.0 points in the control group.


Includes the processes in the AAAs program for the primary grades.


Describes the designing of a program, based on the reactions to the proposed materials of a group of first graders.


A comparative chart including projects for Kindergarten.

A chart listing ten projects. Information includes project title and director, address, purpose and grade level, present accomplishments, project evaluation, future plans, commercial affiliations, materials for purchase and free materials.


Examines the extent to which Science — A Process Approach, a recently developed K-6 science curriculum, affects four aspects of creative thinking and performance in the processes of classifying and inferring in the second grade.


Describes a test of the Bereiter-Engelmann program in a Head Start setting. Results indicated that long-term exposure to B-E curriculum raised IQ's and stimulated development in reasoning ability. Bibliography.


The most significant finding of this study appears to be its demonstration that science and/or visual perception instruction can be included in kindergarten programs without impairing the readiness attainment of children so trained.


Includes earth-space concepts for primary level and a suggested approach to sequential science learning.


An attempt to determine whether an inquiry science program which provides the beginning first grade child with a variety of experiences with objects from his environment can significantly enhance the rate of attainment of conservation skills.

The bulk of this article is concerned with curricular development at the Kindergarten-Primary level.


Includes a discussion of the science curriculum's emphasis on care, observation and function, rather than on structure.

G. Discrimination


Forty 3-4-year-old children were given cross-modal transfer problems involving presentation of identical form discriminations in the visual and tactual modalities. Transfer, without relevant verbalization, was obtained from vision to touch, but not from touch to vision.


Purpose of study: to test two planned training sequences designed to increase auditory discrimination.


Results of this study indicated a significant deficiency in auditory discrimination among the economically disadvantaged group.


Differences in hue had no significant effect on color matching at Kindergarten level, while differences in brightness produced the greatest number of color matches.


Investigates the ability of young children to discriminate accurately forms which vary in complexity, line type and structure.

A study in which 48 kindergarten children were taken through a successive discrimination task to which they could respond correctly either on the basis of number or color.


Most 3-year-old subjects were unable to maintain a stable discrimination performance.


Four-year-old nursery children were used to study the relation between discrimination and preference. Differences were significant in the relational discrimination scores for high and low preferrers.


Describes two experiments studying the relations among preschool children's preferences for color and form attributes, speed of learning an initial problem, and optional shift behavior in discrimination training.

H. Goals


Discussion of values and goals of preschool education includes introduction of scientific concepts.


Includes a section on science teaching which discusses the experimental approach and the shift in emphasis from product to process.


"The science program for young children should deal with concepts that are consistent with their intellectual development. The emphasis should be on phenomena that may be observed and manipulated." A thoughtful and perceptive treatment of the subject.


Includes discussion of math and science goals of the Soviet Kindergarten Education Program.

1. Headstart

Discusses the value of a science program for deprived young children. States that variety and balance, coupled with flexibility, are key values for well thought-out science curriculum for young child.

Discusses activities related to measurement concepts.

Achievement assessed and compared for the three groups on five variables: articulation, auditory discrimination, visual discrimination, recognition vocabulary and conceptual maturity.

Muse, Vernon Clyde, Ed.D. An Assessment of "Headstart" Training on Intelligence and Achievement of a Selected Group of First Grade Students. Dissertation: Mississippi State University, 1968. DA 29-6:1724A.
No statistically significant differences shown between test and control groups.

An evaluation in which teacher comments support the effectiveness of the program. K and G1 teachers report that younger siblings of pre-Headstart children, who have attended Headstart schools, show improved behavior and readiness compared to their older brothers and sisters.
Orton, Richard E. "Head Start ... We're Past the Trial Run." Instructor 76:24-5. December, 1966.
An extensive listing of materials for specific Headstart activities.

No significant differences in performance or gains between the samples on readiness tests or teacher ratings. Kindergarten teachers noted more improvement than indicated on tests.

Includes guidelines for developing science and math concepts.

J. Materials

"If we aim at encouraging a child to discover for himself his own and the world's boundaries and possibilities, the physical structure of a school must be of a kind which will aid self-knowledge and independent inquiry."

A comprehensive listing of materials, arranged by such subject areas as Science (22 items), Building Blocks, Wheel Toys.
Note: This article is one of a group of several articles in this issue under the heading, Special Report: How Preprimary Programs Work (pp. 48-68+).

Covers materials needed, procedure and what to collect.

Discusses kindergarten activities with food choppers.

Process of preschool "education with purpose" involves a variety of materials to provide "ventures into the unknown." Should seek awareness of "the beginning of things."
Includes specifications for science carrels at the K-3 level.

K. Montessori

Assesses whether Montessori's cylinder block training hinders or facilitates the acquisition of conservation using 32 kindergarten children.

Includes excellent photos showing science-correlated activities for young children.

Montessori and Piaget should be accepted on their own terms and their ideas not forced into current conceptual frameworks.

Discusses adaptation of Montessori methods to current situations.
Includes suggested activities for sense development. Bibliography.

Discusses incorporation of her ideas in modern practice without following the strict, orthodox methodology.

This concise evaluation includes a discussion of the Bereiter plan.

Two articles — one favoring and one critical of Montessori methods.
Includes examination of approach to experimentation and investigation.

This article includes over four pages of "notes" which comprise an excellent bibliography of the literature of the Montessori Method.
L. Perception


Determined whether 5-year-old children could match the brightness of a light to the loudness of a sound.


A study of the content validity of the widely used Frostig test.


Identical tests were given to groups of nursery school and 7-9-year-old children. The preschoolers gave more color responses under all conditions than did the 7-9 group.


Haptic perception, according to Piaget, is the ability to recognize objects by the sense of touch alone. This study was conducted to assess the combined effects of the retention of learning and the development of haptic perception in preschool subjects who had participated in an earlier (1966) haptic learning experiment.


Discussed a study in which 24 3-5-year-olds were given a perceptual task (color matching), a memory task (color recognition), and a labeling task (color naming).


Confirmed the possibility that the eye and the hand sample different properties of the same stimulus. Ss 30 kindergarten and 74 second grade children.


Transitive reasoning, as demonstrated in the solution of verbally presented problems, was studied under three conditions of perceptual cues.

Purpose of study: determination of whether children between 3.5 and 4 years old could learn to perceive the critical elements of shape through a learning program in perceptual-motor activity and retain this learning.


Reports a follow-up study of achievement in G1 after training with the Frostig Program for Development of Visual Perception in Kindergarten.

Includes discussion of development of scientific perception. Suggests activities for Kindergarten and Primary.

M. Piaget


A longitudinal study examining the question: "Does the ability to carry out operations of class and seriation as they relate to number concepts develop according to a pattern which could be described as synchronous or sequential?"


Behavior and explanation conservation items given to sample of 143 K, G1 and G2 children. Two scales constructed from these items. Scales cross-validated on new sample. Significant correlations with school grades and other variables found.


Piaget and Montessori should be accepted on their own terms and their ideas not forced into current conceptual frameworks.


Subjects were pupils of seven Nigerian primary schools. Results generally upheld Piaget's theory.

The prediction and direct perception of the position of the water line in tilted jars was investigated in 20 preschool children.


A conceptual framework for a preschool curriculum is indicated, that is particularly geared to the needs of disadvantaged children leading to the development of logical thinking and creativity.


Reviews the implications of the cognitive-developmental theories of Baldwin, Dewey, Piaget and Vygotsky for preschool children. Thesis: cognitive-developmental components of preschool play and other activities should be systematically formulated.


Findings support Piaget's hypothesis of sequential stages in both cognitive and moral judgement; also, his thesis of concomitant growth of the two modes of thought.


This study of Negro and white first graders reveals that the development of Piagetian conservation concepts reflects differences in cultural background rather than in race.


The study's data suggest that an infant can cope with single invisible displacements not involving movement before he can handle complex visible displacements that do involve movement. Subjects ranged from 6 months to 18 months of age.
A scholarly discussion of Piaget's theory of cognitive development.

Discusses the possibility of accelerating a child's development through instruction which places the child in situations which produce a resolvable cognitive conflict.

Three standardized reversibility training procedures were established to provide individual instruction in conservation of number to 100 kindergarten children.

Presents a summary of the author's conception of cognitive development, with comments concerning the views of Chomsky, Bruner, Gesell, and others.

"If acceleration of development is possible, we can profitably expose the child to more mathematics than is presently incorporated in the elementary school program." Bibliography.

Idea of conservation of matter (referring to concept of sameness) was chosen for acceleration through training. Results showed changes in performance for transitional children but no significant changes for nonconserving children.

Poems and verses from five selected anthologies plus 17 original verses, were analyzed.

Discusses the development of the child's intelligence using a step-by-step approach which facilitated the transition from sensory-motor to conceptual intelligence. Bibliography.

Purpose of the study: to determine whether a relationship exists between developmental age and the ability to internalize and reproduce three-dimensional forms in two dimensions.

N. Problem Solving

Discusses changes that occur in children's problem-solving behavior at about age 5.

Conclusion: the test developed in the study is a valid and reliable instrument with a set of standardized grade-placement scores available for three different socio-economic areas.

Discusses observations made during a visit to British schools involved in teaching innovative primary school mathematics programs.

Describes the administering of a set of acetate puzzles permitting use of form and color to 36 children in nursery school through G3.

An observing response procedure and instructions designed to induce a problem-solving set were studied in 48 Kindergarteners presented with matching sample-to-sample problems. The antecedent variables were found to facilitate performance.


Results indicate that mastery of matching-to-sample problems by 99 kindergarteners involved an abrupt shift from chance to perfect performance.


The stimulus interaction predicts that increasing the similarity of a pair of irrelevant stimuli will facilitate learning in the simultaneous discrimination problem and increase the difficulty of the successive problem.


Includes an extensive listing (c80 entries) of "Selected Research References" in problem solving.

Young, Arnold, Ph.D. Problem Solving in Preschool Children as a Function of Motivation and Type of Reinforcement. Dissertation: Temple University, 1968. DA 29:1500-B.

Subjects for this study were lower socio-economic class, Negro, preschool children.

II. MATHEMATICS


Identifies and discusses the basic concepts to be developed at this level and selection of appropriate activities. Bibliography.


Purpose of study: to develop a test of understandings of selected properties of number systems suitable for use with Grades 1 and 2. Bibliography.

A description of some of the mathematical understandings which may be developed with young children.


A test of pupil understanding of basic properties of a number system was developed and administered to G1 and G2 children. It was found to have a high degree of reliability and validity, as well as suitability for the primary grades.


Discusses first grade activities with measurement.


Pilot study to determine if science could be taught to 3-5-year-olds.


Reports a series of studies in which 50 Kindergarten children were given systematic tutoring in number concepts in the preschool age.


Purpose of study: to examine the development of number understandings of five year old children.


Presents the rationale for and the content of a mathematics program written for and taught to a group of Mexican-American disadvantaged first-graders. Bibliography.
Deal, Therry N. and Jeannine P. Maness. "New Horizons in Kindermath." Young Children 23:354-7. September, 1968. Study reveals that nursery and Kindergarten teachers have been giving math concepts to children but may not have been aware of what they were doing.


Gurau, Peter K. "A Deck of Cards, a Bunch of Kids and Thou." Arithmetic Teacher 16:115-17. February, 1969. The following series of card games is offered almost as a curriculum in beginning mathematics. It presupposes only that the youngsters have all learned to recite the counting numbers up through ten.


Using the difference between pre- and post-test scores as criteria, the results suggest that all the children learned the required skills.

Describes three lessons: The Use of Records, Making a Record of Groups of Things, and Developing an Understanding of Two-Place Numerals.

The article is profusely illustrated and includes a complete list of materials and occupations.

Purpose of study: to determine the understanding of specific number concepts of preschool children and to attempt to determine mathematical areas that need emphasis in the Head Start Curriculum.

Explores a wide variety of experiences based upon the use of a geoboard and rubber bands.

Describes children's use of materials during problem solving in the area of measurement.

Introduces number concepts through the use of patterns.

Presents the essentials of an explanatory note to the new mathematics syllabus adopted September 1, 1969, for use in all Soviet first grades.
Features tasks and activities on three levels (Level I: age 5-7).

Bibliography.

Describes experiences which help to develop basic math understandings, such as set matching and measurement.

Discusses the role of mathematical readiness activities in preschool programs for disadvantaged children.

Describes activities involving sets of large cutout pictures.


One finding: a strong relationship exists between kindergarteners' ability to rote and rational count.

 Discusses the role of mathematics in kindergarten as a prerequisite to perceiving, discussing and reasoning about the quantitative aspects of life.

Major purpose of study: to determine the "amount" and "kind" of mathematical information possessed by children entering kindergarten.

Findings of study tend to support occurrence of some intertask interference and some facilitation. Facilitation occurred more frequently than interference.

Discuss activities correlated to the fact that both math and art are concerned with the objective of helping children develop visual perception skills so they can recognize and identify shapes, sizes and colors.


An attempt to gather evidence contributing to the knowledge relating to the question of the effects that introductory methods of instruction and socio-economic status have on mathematical understandings of first grade children.


Piaget-type number concept test given to sample of entering G1 children. Some conclusions: conservation of number seems to be more highly related to achievement than counting or cardination; wide variance of understanding of Piaget-type number concepts.


Discusses the preschool development of the concept of various relationships, such as "more than," "less than," "the same as" and one to one.

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A general annotated listing of periodical and pamphlet references covering the period 1963-4 and including many science-oriented entries.

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