Graphing Experiences:

An Annotated Biblography

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Graphs are a vital part of the world of communication. They simplify masses of statistics and present them in concise form. All communication including graphs must be interpreted. Therefore, children should have ample opportunity to discuss and ask questions about their graphs.

Graphing is an important skill in the activity approach to mathematics. Graphs make the discovery of relationships and principles easier.

Since graphs are important in the child's everyday living and in his mathematical experiences, we should do more work with graphs in the elementary school program. The following selected references suggest many activities which you can use to give your students some interesting experiences with graphing.

▶Berry, Clifford. "Probability and Graphing", *Mathex*, Level 4, Teacher's Bulletin No. 12. Toronto: Encyclopaedia Britannica, 1967.

The usefulness of graphing, so that more information can be generated, is seen in this study of probability.

▶Bishop, Carolyn. "Graphical Illustration", *Mathex*, Level 3, Teacher's Bulletin No. 1. Toronto: Encyclopaedia Britannica, 1967.

A variety of materials is suggested for the concrete construction of column graphs. Situations that are real-life to young students and from which meaningful graphing can develop are described and illustrated.

▶Boxell, L. "A Graph by any other Name ...", *Mathematics Teaching*, 42 (Spring 1965), 14-15.

A plea for greater uniformity in the naming of the graphs commonly found in elementary schools, this short article clarifies some simple types of graphs and scales.

▶Fyffe, R. M. "Show Me", *Primary Mathematics*, 8 (December 1970), 152-162.

A number of practical examples suggest ways to develop an understanding of ordered pairs and how this kind of data can be graphed in a variety of forms.

▶France, Norman. "Counting with a Purpose", *Mathex*, Level 5, Teacher's Bulletin No. 1. Toronto: Encyclopaedia Britannica, 1967.

Numerous suggestions concerning the collection and graphing of statistical data are provided so that seven experience stations can operate profitably in a classroom.

▶Girard, Ruth A. "Development of Critical Interpretation of Statistics and Graphs", *The Arithmetic Teacher*, 14 (April 1967), 272-277.

An appeal for a planned program in critical interpretation of statistics and graphs is followed by a description of a sample unit. Relative error, sampling, incomplete information and average are some of the concepts discussed.

▶Hallam, Frances. "Recording Information", *Mathex*, Level 1, Teacher's Bulletin No. 15. Toronto: Encyclopaedia Britannica, 1967.

Finding ways of recording information leads children to utilize the number line and from there to move into bar and column graphs. Anecdotal descriptions of classroom activity illustrate the author's approach to this topic.

▶Heard, Ida Mae. "Making and Using Graphs in the Kindergarten Mathematics Program", *The Arithmetic Teacher*, 15 (October 1968), 504-506.

The experiences of small children who construct their own block, bar and picture graphs are described and illustrated.

▶Jorden, Janet. "Graphing Relationships", *Mathex*, Level 2, Teacher's Bulletin No. 12. Toronto: Encyclopaedia Britannica, 1967.

The "Steps and Stages in Graphing" are set out in model form. Classroom situations illustrate each aspect listed. The emphasis is on teacher guidance, pupil activity and relationships.

▶Junge, Charlotte. "Dots, Plots and Profiles", *The Arithmetic Teacher*, 16 (May 1969), 371-378.

The initial need to teach graphing, as well as the necessity to plan a sequential treatment of the topic, is argued clearly. Various types of graphs, with sample questions, emphasize the benefit to children who not only interpret others' graphs but also construct their own.

▶Lansdown, Brenda. "Exploring Rate Graphs with Gifted Ten-year-olds", *The Arithmetic Teacher*, 11 (March 1964), 146-149.

Children involved in graphing practical situations are motivated to play with concepts of straight line and parabolic graphs. These pupils are encouraged to relate practical, theoretical and graphical ideas to form a pattern of thinking.

▶Liedtke, Werner W. "Battleship", *Mathex*, Level 4, Teacher's Bulletin No. 14. Toronto: Encyclopaedia Britannica, 1967.

This popular game is an excellent example of mathematical ideas being reinforced in an enjoyable atmosphere. Children become familiar with the location of coordinate points, the transformation of geometric figures and positional estimation. This article sets out the rules very clearly and also suggests some possible adaptations.

▶Lowery, Lawrence F., and Donald Lundstrom. "Graphic Representation of Plant

Growth", *Science and Children*, 4 (April 1967), 15-17.

The practical application of graphing techniques at various grade levels shows the advantages of giving children numerous experiences in the construction of a variety of graphs.

▶Martin, J. R. "Graphical Representation", *Primary Mathematics*, 9 (June 1971), 3-14.

One situation, that of the books the children have read, is used to provide a survey of ways of recording data in an organized fashion, from simple arrow graphs to coordinate graphs. The factors to be considered in choosing a particular kind of graph for specific data are set out clearly. The use of graphical representation in order to make predictions is discussed.

▶McGlathery, Glenn. "Tic-Tac-Toe Graph - an Elementary Graphing Game", *Science and Children*, 8 (November 1970), 19-20.

This game, which practises the naming of intersections on a coordinate graph, can be played by a pair of children or a whole class.

▶Moulds, Doris M. "Graphs", *Mathex*, Level 1, Teacher's Bulletin No. 11. Toronto: Encyclopaedia Britannica, 1967.

Pictorial Representation is developed from one-to-one correspondence through to the stage of using "quadrille" or grid paper to record the data which children have gathered from their own environment. Some of the well-described suggestions for classroom activity are illustrated.

▶Nelson, L. D., and W. W. Sawyer (eds.) *Mathex: Matching and Graphing* (Teacher's Resource Book No. 1). Toronto: Encyclopaedia Britannica, 1970.

The reasons for the inclusion of graphing in primary grades are established initially. Numerous suggestions are given for meaningful situations suitable for recording graphically. The young pupils are encouraged to construct their own graphs in a variety of ways. A similar policy is suggested for older students who bring a greater sophistication to their organization of relationships and other data. The introduction of coordinates is given special consideration.

▶Nelson, L. D., and W. W. Sawyer (eds.) *Mathex: Graphing and Probability* (Teacher's Resource Book No. 6). Toronto: Enclopaedia Britannica, 1970.

Various types of graphs are dealth with in detail, with plenty of practical applications being suggested. The game "Battleship", based on coordinates, is especially well treated. The graphing of ordered pairs and equations can help children realize the connections between certain branches of mathematics. Activities are provided to give pupils a meaningful introduction to statistics, particularly to the notion of the spread of distributions.

▶The Nuffield Mathematics Project. *Pictorial Representation*. London: W & R Chambers and John Murray, 1967.

In this approach, graphs are seen as pictures of relationships. They communicate, and the communication must be interpreted. Many examples of children's construction and interpretation of various kinds of graphs are included. The emphasis is on meaningful data. This 40-page book is full of practical suggestions for teachers of Grade I through to Junior High School.

▶Pierson, Robert C. "Elementary Graphing Experiences", *The Arithmetic Teacher*,

16 (March 1969), 199-201.

An easy development of graphing places initial emphasis on one-to-one correspondence. A number of interesting topics are suggested to give practice in various types of graphs.

▶ Pincus, Morris, and Frances Morgenstern. "Graphs in the Primary Grades", *The Arithmetic Teacher*, 17 (October 1970), 499-501.

The ability to read and construct graphs is developed through a sequence of illustrated activities that proceed from concrete objects to symbolic representation.

▶ Pomeroy, David J. "Pictorial Representation - Is There a Progression?" *Primary Mathematics*, 9 (Summer 1971), 78-84.

It is argued that the development of abilities in graphing lies not in the type of graph nor in the content, but in the interpretation of the graphs constructed. An outline scheme presents a clear program. Examples of children's work on a single topic are included to show the increasing sophistication of interpretation.

▶ Schell, Leo M. "Horizontal Enrichment with Graphs", *The Arithmetic Teacher*, 14 (December 1967), 654-656.

The problem of plotted points which do not lie on a straight or a smooth line is raised in four sample lessons. Stimulating "thought" questions, rather than "solutions", are included in the self-administered units.