THE DEVELOPMENT AND TESTING OF AN INSTRUCTIONAL PACKAGE TO TEACH THE BASIC MAP READING SKILLS OF LATITUDE AND LONGITUDE TO LOW-ACHIEVING JUNIOR HIGH SCHOOL STUDENTS

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ABSTRACT

The purpose of this study was to develop and test an instructional unit on the topic, "Latitude and Longitude," and to decide whether such a social studies instructional unit produced positive achievement for slow-learning students at the junior high school level. The unit was developed in response to an educational problem that centers around the fact that children vary individually in their learning capacities as they enter junior high school. Prior to and in conjunction with the development of the instructional package a review of literature and research related to instructional development and learning theories in general and to map skills specifically was conducted. Also, it was hypothesized that the instructional unit leads to a greater achievement than the traditional textbook-lecture method of instruction.

The steps involved in designing the instructional package were described and revisions were made on the basis of criticisms from teachers, a professional geographer, an instructional development specialist, and a group of students. The package was subjected to the Lorge-Thorndike word list and revisions were made, where necessary, in order to arrive at a vocabulary level appropriate for a slow-learning grade seven class.

After the program was developed, it was tested and evaluated

at Beothuk Collegiate, Baie Verte, Newfoundland. The kit was compared with the textbook-lecture method of instruction in an experimental versus a control group situation. Through a table of random selection the students in a slow-learning grade seven class were assigned to treatments. A pretest-posttest design was used to test the hypotheses. A t-test was used to test for significant differences.

The limitations and findings of the study were listed and described briefly. Also, suggestions for future research and development were presented for consideration.

On the basis of the findings it was concluded that the instructional package may be used as prerequisite material to assist pupils in gaining an understanding of place location and other related map reading skills.

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This internship project is dedicated to

my son Michael and my daughter Pamela.

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INTRODUCTION

PURPOSE

The purpose of this project was to develop and test an instructional package based on the supposition that students entering junior high school are not all operating at the same level of cognitive development and as a consequence certain social studies skills may or may not have been taught by a teacher or assimilated by a student.

Specifically the writer tried to answer the following question: Will an instructional package especially designed to improve a student's understanding of the necessary prerequisite map skills so that he can continue with the normal classroom activities in map reading prove to be feasible?

BACKGROUND TO THE PROBLEM

In the booklet entitled The Aims of Public Education for Newfoundland and Labrador it is stated that "education is the process by which a human being is enabled to achieve his fullest and best development both as a private individual and as a member of human society."[1]

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[1]Division of Curriculum, Aims of Public Education for Newfoundland and Labrador, Bulletin No. 2-A (St. John's, Newfoundland: Department of Education, 1965), p. 3.

The inappropriateness of the social studies curriculum in Newfoundland and the instructional methods which have often been employed therein have tended to make it difficult for an individual to achieve his fullest potential. In the past more than a few social studies teachers throughout Newfoundland have placed undue emphasis on the lecture type of instruction and the use of the single textbook. This method of providing instruction, along with the large, often overcrowded, classes, presupposes that all students in a particular class covering the same textbook material, and at the same rate, will be able to assimilate the material at the same pace.

PROBLEM

Beginning in 1965, Hodgetts[2] directed a two-year investigation into the teaching of social studies in the elementary and secondary schools throughout Canada. The conclusions of this study indicated that the social studies programs in Canada were in a deplorable condition and that students were developing very poor attitudes toward the social studies. A large portion of this problem in the social studies, Hodgetts concluded, was related to two teaching methods most commonly in use--the lecture and the assignment method. The lecture method was a recitation by the teacher of facts taken directly from the textbook; and the assignment method was the plan of assigning a few pages of a textbook to study at home, and spend-

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[2] A. B. Hodgetts, What Culture? What Heritage? (Toronto, Ontario: Ontario Institute for Studies in Education, 1968), p. 1.

ing time in class questioning students to find out what facts they remembered.[3]

Quality educational programs which have as their raison d'etre the fullest development of a student should be stressing growth in a wide variety of skills and attitudes. Hence teachers ought not to rely on the traditional selection and implementation of materials. Diversity among students must be reflected in the selection and use of a variety of teaching techniques.

Hodgetts states that contemporary educationalists would consider the commonly used textbook-lecture method as highly undesirable, in that it violates recognized principles of pedagogy.[4] One observer who would concur with Hodgetts sees the persisting educational trend as being toward the progressive philosophy of education with an emphasis on Gestalt theories of learning.[5] This school of thought stresses that learning must be accomplished by the individual himself.

Successful teaching of subjects such as social studies cannot be achieved until the teacher comes to grips realistically with the problem of the wide range of abilities and backgrounds which exist among students, particularly those from the rural areas. Under the present educational system in Canada (and elsewhere) there is a substantial group of students who are unable to make normal progress in

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[3] A. B. Hodgetts, What Culture? What Heritage? (Toronto, Ontario: Ontario Institute for Studies in Education, 1968), p. 45.

[4] Ibid.

[5] Nelson L. Bossing, Teaching in Secondary Schools (Boston: Houghton-Mifflin, 1952), p. 61.

their school learning. These are predominantly the students whose early experiences in the home, whose socio-economic background, and whose motivation for school learning places them in the category of slow-learners.

Cuban presents eleven factors for identifying the slow-learner:

1. He has an I.Q. between 75 and 90.
2. He cannot handle abstractions and has difficulty in learning symbolic language.
3. He has limited imagination.
4. His language development is slower than that of normal children.
5. He has unsystematic thought processes.
6. He has limited powers of independence, initiative and resourcefulness.
7. He has a tendency to live only for the present.
8. His attention span is short.
9. He has a tendency to be a follower rather than a leader.
10. He has a low self concept.
11. His values are unclarified.[6]

Due in part to cultural conditions, such children read at a level three or four grades below their normal development. They obviously achieve in academic areas at a considerably slower pace than do other children. Often they do not exhibit the curosity and creativity shown by brighter children.

A large proportion of these youth come from lower-class homes (sociologically speaking) in which the parents may have had a minimum of formal education. These factors exert profound influences on the cognitive structures of the children. Steinbrink, who did some research on the effectiveness of advance organizers for teaching geography to disadvantaged students, maintains that the "disadvantaged

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[6]Larry Cuban, "Yet To Be Taught: The Teacher and Student as Slow Learners," Social Education, XXXIV, 2 (February, 1970), 145.

student is experientially disadvantaged according to the criteria set down by the school system which emphasizes verbal learning and formal language structures."[7] According to Ausubel and Youssef[8] and Bloom, Davis, and Hess[9], initial language deficits tend to increase the longer the disadvantaged remain in school.

If schools are to assume responsibility for ensuring that the slow-learner has the opportunity to develop the necessary skills to function effectively in a democracy, then his learning problems necessitate that the teacher go beyond the narrowly conceived confines of the present curriculum. Bloom stresses this point very strongly when he explains:

> ...the culturally deprived child comes to school with deficits in learning sets and the ability to 'learn to learn'. Since he lacks particular experiences and since he is at a relatively low level of linguistic development, he is usually not ready to begin his learning at the same level and by the same approach as is characteristic of children from favorable cultural environments. Unless the school reshapes its curriculum and methods to begin with the child where he is, learning cannot proceed in a fruitful and meaningful way.[10]

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[7] John E. Steinbrink, "The Effectiveness of Advance Organizers for Teaching Geography to Disadvantaged Rural Black Elementary Students." (Unpublished Doctoral dissertation, University of Georgia, 1970).

[8] David P. Ausubel and M. Youssef, "The Role of Discriminability in Meaningful Parallel Learning," Journal of Educational Psychology, LIV, 6 (1963), 331-336.

[9] B. S. Bloom, A. Davis, and R. Hess, Compensatory Education for Cultural Deprivation (New York: Holt, Rinehart & Winston, 1965).

[10] Ibid, p. 20.

Kopp also suggests that "teaching the slow-learner involves making adjustments and limiting expectations."[11]

The low-ability student needs many concrete, first-hand experiences. Instruction must be based on activities requiring little reading or analyzing. Learning tasks must be specific and simple or as Kopp suggests: "the load of abstract and verbal symbols must be minimized."[12]

Odle explains that it is the teacher's responsibility to make certain that the slower student's needs are provided for:

> No matter how well equipped the classroom is, there will always be the child with a problem that requires something else for remediation. Skill in adaptation or construction of materials is necessary to provide for this child's needs. It also becomes necessary to adapt or construct materials when there is nothing commercially available that adequately and effectively presents a concept, skill, or idea.[13]

Coxe, in writing on social studies instruction, also emphasizes the importance of providing for individual differences:

> One of the biggest tasks, then, in improving social studies instruction is to examine our organizational plans and instructional practices and seek better ways

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[11] George W. Kopp, "Providing for Individual Differences," Social Studies for the Middle Grades: Answering Teachers' Questions, ed. C. W. Hunnicutt (Washington, D. C.: National Council for the Social Studies, 1960), p. 87.

[12] Ibid.

[13] Sara J. Odle, "Constructing and Adapting Materials," Individualizing Educational Materials for Special Children in the Mainstream, eds. Robert M. Anderson, John G. Greer, and Sara J. Odle (Baltimore: University Park Press, 1978), p. 158.

> to meet individual differences. We need to develop programs that will help each individual to develop his potentialities and achieve his goals.[14]

Jarolimek, like Coxe, also stresses the need for providing for individual differences in social studies. He suggests that no program in social studies can be rated well unless it comes to grips with this problem.[15] Jarolimek later stresses the point that:

> Because classroom instruction is ordinarily conducted on a group rather than individual basis, the teacher must use methods of instruction that will be appropriate for individual students. This means that differentiated teaching strategies must be used in helping pupils attain objectives.[16]

Among the strategies being implemented today to meet the unique needs of students are instructional packages.[17] An instructional unit is better able to meet the needs of each student than is the lecture method. Most materials in these packages are self-instructional. The teacher needs to spend very little time in group in-

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[14] Ross M. Coxe, "Strengthening Classroom Instruction in the Social Studies," Individualizing Instruction in Reading and Social Studies, ed. Virgil M. Howes (London, England: MacMillan Co., 1970), p. 173.

[15] John Jarolimek, Guidelines for Elementary Social Studies (Washington, D. C.: Association for Supervision and Curriculum Development, NEA., 1967), p. 23.

[16] Ibid.

[17] Throughout the report instructional package, instructional kit, and instructional unit will be used interchangeably to mean one and the same thing.

struction and instead gives more attention to diagnosing where the student is in relation to where he needs to be and prepares prescriptions to move the child toward the mastery goal.

Statement of the Problem

The problem dealt with in this project is the development and testing of an instructional package. The package attempts to accomplish the following objectives:

1. Provide a base for revisions and improvement of learning materials.
2. Provide student mastery of skills.
3. Provide a vehicle for individualization.
4. Suggest areas for production of other similar instructional kits.

More specifically, the purpose of this project is the development of an instructional package to accompany the map skills section of the grades seven and eight geography series—Introducing Earth, Parts I and II by L. F. Hobley. The package is designed for the low-achieving student coming into junior high school who needs certain prerequisite map skills.

Relation of the Problem with Instructional Theory and Learning Psychology

The design of effective instructional units to teach skills

and concepts in the social studies needs to be arranged so that it will bring about a kind of change in a student which is called learning, and this requires a consideration of learning theory and instructional theory.

"There is a wide range of opinions," Snelbecker explains, "as to the most appropriate relationships between learning theory and instructional development."[18] Some take the position that learning theory and instructional theory are interdependent, with each developing somewhat independently and involving ongoing exchange with the other. Others take the position that psychological theories may constitute the best basis for evolving instructional theories, and they frequently cite learning theories as being the primary source from which instructional theories can be derived.[19]

Skinner has consistently argued that an understanding of the psychological processes involved in learning is not enough. He suggests that what is needed is a direct study of the teaching-learning process in order to develop principles concerning teaching, rather then merely being satisfied with an understanding of the underlying psychological processes involved in learning.[20]

If an educator is going to select a learning theory, it would

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[18]Glenn E. Snelbecker, Learning Theory, Instructional Theory and Psychoeducational Design (New York: McGraw-Hill Book Co., 1974), p. 147.

[19]Ibid.

[20]B. F. Skinner, "Are Theories of Learning Necessary?" Psychological Review, LVII (1950), 193-296.

seem reasonable to expect that the theory picked would be one which provides the most complete and valid description of learning as it occurs in the classroom. However, as Snelbecker explains, "from the standpoint of validity and accuracy in describing learning process, no single theory has been identified by learning researchers in toto as being clearly the most valid and comprehensive theory of learning extant."[21]

Proclaiming his commitments to the notion that it does make a difference as to how students are taught, Siegel also attributes the confusion in education and its significant influences as having been obscured by a relative lack of adequate theory:

> A sound theoretical base can (1) suggest better educational practices than are now prevalent; (2) permit predictions about the effectiveness and ineffectiveness of contemplated innovations, thereby offering educational administrators a highly practical basis for making judgements; (3) guide future research efforts in systematic rather than fragmental directions.[22]

One of the most vocal advocates of a theory of instruction is Jerome Bruner. He takes the position that learning theories and developmental theories make their contributions to the teaching-learning syndrome, but that in addition there must exist a theory of instruction:

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[21] Glenn E. Snelbecker, Learning Theory, Instructional Theory and Psychoeducational Design (New York: McGraw-Hill Book Co., 1974), p. 123.

[22] L. Siegel, ed., Instruction: Some Contemporary Viewpoints (San Francisco: Chandler Publishing Co., 1967), p. ix.

> It is this that leads me to think that the heart of the educational process consists of providing aids and dialogues for translating experience into more powerful systems of notation and ordering. And it is for this reason that I think a theory of development must be linked both to a theory of knowledge and to a theory of instruction, or be doomed to triviality.[23]

Later in the same book Bruner goes on to emphasize that in contrast with learning theories, which merely describe processes, an instructional theory should prescribe the optimal arrangements of conditions which will facilitate meaningful school learning:

> ... theories of learning and of development are descriptive rather than prescriptive. They tell us what happened after the fact.... A theory of instruction, on the other hand, might attempt to set forth the best means of leading the child toward the notion of reversibility.[24]

Snelbecker maintains that "any instructional theory should be developed alongside learning and development theories, and its principles should be congruent with psychological theories."[25] Whereas a theory of learning must be comprehensive as to why changes in learning occur, but may be incomplete as to practical implications for the teaching arena, the ideal instructional theory must be comprehensive as to practical applications but may be incomplete as to why such procedures are effective.

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[23] Jerome S. Bruner, Toward A Theory of Instruction (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1966), p. 21.

[24] Ibid., p. 40.

[25] Glenn E. Snelbecker, Learning Theory, Instructional Theory, and Psychoeducational Design (New York: McGraw-Hill Book Co., 1974), p. 419.

Ausubel is another example of a psychologist who advocates utilization of learning research and theory in the formation of instructional principles. He contends that learning theories and instructional theories are interdependent and that both are needed for a complete science of pedagogy since neither can adequately serve as a substitute for the other.[26]

Sequencing Instruction

Gagne suggests that "the act of instruction is a matter of stimulating the student in certain ways."[27] Stimulating the student, however, means that the level of instruction and information must be matched to the level of cognitive development of the child. When the child's cognitive structure and subject matter are mismatched, learning is impeded and slowed down. Each future step in the cognitive development sequence depends upon the successful implementation of past stages.

Jarolimek emphasized the need for sequence, particularly in the area of social studies skill development:

> Sequence may be important in all cognitive learning. Yet in concept attainment and skill development where it can be established that there is an increasing order of magnitude in complexity and where a functional relationship exists between elements on this continuum of complexity,

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[26] David P. Ausubel, Educational Psychology: A Cognitive Review (New York: Holt, Rinehart & Winston, 1968).

[27] Robert M. Gagne, "Learning Theory, Educational Media, and Individualized Instruction," To Improve Learning: An Evaluation of Instructional Technology, II, ed. Sidney G. Tickton (New York: R. R. Bowker Co., 1971), p. 63.

sequence is essential to effective teaching and learning.[28]

It is Miller's contention that "an effective sequence of instruction, in any medium, must include provision for four conditions: motivation, cue, response, reward."[29] What this means is that to be most effective, the motivations aroused by instructional materials must build upon those that are already in the life experiences of the student. Skinner's analysis of instruction assumes that "motivation must be present."[30]

Gagne, in his book The Conditions of Learning, refers to "cumulative learning." This is the principle that the learning of any new capacity builds upon prior learning. Unless the learner can recall this prerequisite capability, he cannot learn the new task.[31] Gagne has approached the problem of human learning and its contributions to development from the point of view of determining the prerequisites for specific learning tasks. According to his model of learning the acquisition of a complex concept or skill is a hierarchical process in which lower order concepts or skills are generally integrated to form

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[28]John Jarolimek, Guidelines for Elementary Social Studies (Washington, D. C.: Association for Supervision and Curriculum Development, NEA., 1967), p. 16.

[29]Neal E. Miller, "Graphic Communication and the Crisis in Education," AV Communications Review, V, 3 (1957), 6.

[30]Robert M. Gagne, "Learning Theory, Educational Media, and Individualized Instruction," To Improve Learning: An Evaluation of Instructional Technology, II, ed. Sidney G. Tickton (New York: R. R. Bowker Co., 1971), p. 63.

[31]Robert M. Gagne, The Conditions of Learning (New York: Holt, Rinehart & Winston, Inc., 1965).

higher order ones.[32] Gagne introduces his theory of prerequisites in the following way:

> From where does the student begin and where is he going? What are the specific prerequisites for learning, and what will he be able to learn next?... What is meant by "prerequisite" is not that fourth grade social studies must precede fifth grade social studies. Rather, the meaning is that learning to pronounce foreign words must precede learning to use them in sentences; or that learning to count numerically must precede learning to add numbers.[33]

Ausubel, in his defense of verbal learning, explains that "existing knowledge serves as the 'ideational scaffolding' to which new knowledge can be related."[34] In a still later book called The Psychology of Meaningful Verbal Learning Ausubel refers to "consolidation"--the mastery of ongoing lessons before new materials are introduced.[35] This is similar to Gagne's "cumulative learning".

In another article Ausubel reinforces his opinions when he says that new ideas and information are grasped and retained by the learner "only to the extent that more inclusive and appropriately relevant concepts are already available in the cognitive structure to

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[32] Robert M. Gagne, "Contributions of Learning to Human Development," Psychological Review, LXXV, (1968), 177-191.

[33] Robert M. Gagne, The Conditions of Learning (New York: Holt, Rinehart & Winston, Inc., 1965), p. 26.

[34] David P. Ausubel, "Cognitive Structure and the Facilitation of Meaningful Verbal Learning," Journal of Teacher Education, XIV (June, 1963), 222.

[35] David P. Ausubel, "The Psychology of Meaningful Verbal Learning," To Improve Learning: An Evaluation of Instructional Technology, II, ed. Sidney G. Tickton (New York: R. R. Bowker, 1971), p. 67.

serve a subsuming role or to provide ideational anchorage."[36] Bruner, like Ausubel, also identifies the attainment of a clear, stable, organized body of knowledge as a means for enhancing the learner's capacity to learn new information.[37] He takes into account the developmental findings that children initially deal with their environment at a concrete level and that they later apply more abstract conceptions. Thus he suggests that instruction, likewise, should proceed from concrete examples to more abstract formations:

> If it is true that the usual course of intellectual development moves from enactive through iconic to symbolic representation of the world, it is likely that an optimum sequence will progress in the same direction.[38]

In proceeding from concrete to abstract formations, Bruner does not overlook the fact that it may be necessary to return to certain ideas to reinforce and expand concepts. Thus he advocates the episodic or spiral curriculum approach:

> ...ideas are presented in homologue form, returned to later with more precision and power, and further developed and expanded until, in the end, a student has a sense of mastery over at least some body of knowledge.[39]

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[36] David P. Ausubel, "A Cognitive-Structure Theory of School Learning," Instruction: Some Contemporary Viewpoints, ed. L. Siegel (San Francisco: Chandler Publishing Co., 1967), p. 222.

[37] Jerome S. Bruner, Toward A Theory of Instruction (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1966).

[38] Ibid.

[39] Jerome S. Bruner, "On Learning Mathematics," Mathematics Teacher, LIII, (December, 1960), 616-617.

On the other hand there is Piaget, who has commented that the "excellent psychologist, Jerome Bruner, has gone so far as to state that you can teach anything to any child at any age if only you set about it in the right way."[40]

Piaget rejects this notion, his reason being that as development takes place in several major steps, there are certain things that are beyond the grasp of the child until the earliest of these steps have been surmounted. He maintains that development occurs in an invariant sequence of stages such that lower levels are necessary for the occurrence of higher levels in the hierarchy:

> To characterize the stages of cognitive development we therefore need to integrate two necessary conditions without introducing any contradictions. These conditions for stages are (a) that they must be defined to guarantee a constant order of succession, and (b) that the definition allow for progressive construction without entailing total preformation.[41]

Piaget's account of development marks out four broad stages: sensorimotor, preoperational, concrete operational, and formal operational. He maintains that the order of development through the four stages is constant:

> A stage system of this kind...makes up a sequential process: it is not possible to arrive at 'concrete' operations without undergoing some sensorimotor preparation (which explains why, for example, blind people, having badly coordinated action schemata, may be retarded). It is also impossible to

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[40] Jean Piaget, Biology and Knowledge (Chicago: University of Chicago Press, 1971), p. 20.

[41] Jean Piaget, "Piaget's Theory," Carmichael's Manual of Child Psychology, ed. Paul H. Mussen, 3rd ed. (New York: John Wiley & Sons, Inc., 1970), p. 710.

progress to propositional operations without support from previous concrete operations, etc.[42]

West and Foster in writing on The Psychology of Human Learning and Instruction in Education explain that Piaget's theories have implications for learning and instruction. His work serves as the theoretical framework for West and Foster's statement that "instructional experiences may be matched with the cognitive development of the student and timed to the rate of development."[43]

Based on the implications of learning theory to instruction, West and Foster have listed seven practical suggestions that arise out of an instructional theory:

1. When students are having difficulty learning abstract material try to represent the material in a concrete manner.
2. The teacher should analyze students' predispositions toward learning. Are the students ready to learn the material?
3. The teacher should provide advance organizers for material--reading, discussions, and lectures.
4. The teacher should attempt to reduce excessive anxiety.
5. The teacher should try to find out if students think the material is meaningless and only worth learning by rote.
6. The teacher should carefully analyze and select the curricular content for its meaningfulness. Also, is it logical?
7. The teacher should get to know individual students and try to radiate learning environments which match the student's characteristics.[44]

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[42]Jean Piaget, Biology and Knowledge (Chicago: University of Chicago Press, 1971), p. 18.

[43]Charles K. West and Stephen F. Foster, The Psychology of Human Learning and Instruction in Education (Belmont, California: Wadsworth Publishing Co., Inc., 1976), pp. 47-48.

[44]Ibid.

As stated earlier, the purpose of this project was to develop and test an instructional unit. Although the actual details surrounding the choice of topic and development of the instructional package will be discussed later, it must be emphasized that any attempt to design instructional materials to develop social studies concepts and skills must take into account the fact that pupil variations are of such great magnitude and the overlap of achievement in skill development from one grade to another is so extensive that pupils within a grade or class can be expected to differ widely in their attainment of a concept and in their skill proficiency. For this reason, it is unwise to establish a firm and rigid sequence tied to specific grades. As Jarolimek explains, "the grade in which a child is situated has almost nothing to do with what he knows."[45]

SIGNIFICANCE OF THE STUDY

The project was conceived as a consequence of the writer's involvement with a class of low-achieving grade seven students at Beothuk Collegiate, Baie Verte, Newfoundland. According to the instructional and learning theories described in the foregoing subsection, any instruction to be designed for these low-achieving students

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[45] John Jarolimek, Guidelines for Elementary Social Studies (Washington, D. C.: Association for Supervision and Curriculum Development, NEA., 1967), p. 17.

must utilize what is already known about learning theory. The level of instruction needs to be matched to the level of cognitive development of the child. The acquisition of a skill will depend on a child's prior grasp of previously related skills or concepts.

For a number of years the writer has been involved with teaching social studies to slow-learning grade seven students at Beothuk Collegiate. Frustration has arisen because of the fact that a lot of these students are not being prepared to take their position as members of society. Textbooks and other teaching-learning social studies materials are not specifically geared to the needs and interests of the slow-learners. Classroom instruction relies very little on the nature of learning and the need to match the level of instruction to the level of cognitive development of the individual child. Instead, classroom teaching is organized around the class as a whole as opposed to providing accommodation for individual differences.

It was because of the writer's difficulty in trying to teach these slow-learning students basic skills that are necessary to understand and use social studies concepts effectively that the idea for developing the instructional package was conceived. The basic solution was to start with the child where he is and proceed by a carefully developed and sequential program to bring him up to a level where he could learn as well as others in his class and eventually under the same conditions as the other students.

If the results of this study justify it, the use of instructional packages could provide teachers with one possible solution to

the problem of teaching social studies skills to students who are slow-learners and this would hopefully encourage teachers to become involved in developing their own instructional packages.

DEFINITIONS

To clarify the meanings of terms to be used in this study, the following definitions are presented (in alphabetical order):

Achievement was operationally defined as test scores obtained by students upon completion of units of study by both control and experimental groups.

Audio-visual Materials refers to those instructional materials, including the printed word, that made up the instructional learning package.

Control Group was the group of students which was as similar as possible to the experimental group in terms of selection procedures, sex, mental age, and reading ability. The control group was taught by the textbook-lecture method using the same instrumental content as that which appeared in the instructional package.

Criterion-Referenced Tests are standards of measurement used to provide information concerning what specific skills (map reading) a student has or does not have. They also provide an indication of

the effectiveness of instruction. In this study, the criterion-referenced tests were the pre-test and post-test.

Curriculum is a plan for learning. In this study what is known about the learning process (learning theory) and the intellectual development of the individual (genetic epistemology) shaped the plan.

Experimental Group was the group of students which was as similar as possible to the control group, but which received the instructional unit as opposed to the textbook-lecture method of instruction.

Formative Evaluation was carried out during the developmental stage to determine areas of strengths and weaknesses in the instructional package.

Instructional Package refers to the unit on map reading skills of latitude and longitude developed and tested in this study.

Junior High School consisted of grades seven and eight in the target school.

Lecture refers to a teaching procedure in which the teacher prepared the material in the unit and talked to a control group about its contents. Also, the teacher used the chalkboard and dictated im-

portant parts of the content which the student then wrote in his notebook.

Media means the hardware that was necessary to facilitate the use of the instructional kit.

Skills are the basic tools of learning. In this study, skills were those specifically related to map reading.

Slow-Learner was defined as an individual who has a record of low academic achievement as determined from school records and who has a serious reading deficiency (usually two or three years behind the present grade level) as determined from the Canadian Tests of Basic Skills.

Summative Evaluation was the assessment of the instructional unit for the purposes of awarding final marks (for example, 60%, 70%, etc.) for the study. It also acted as a statement of the degree to which a learner's terminal performance approximated that specified by the instructional objectives.

Systems Approach is the application of a scientific systematic approach in designing instruction, from problem identification to the finished product, in a planned and methodical manner in order to get the learner from where he is to where it is felt that he should be. (Friesen explains that this method is used by those who call themselves

instructional programmers and instructional technologists).[46]

Unit refers to an organized sequence of a teaching-learning plan. It can be defined "as a purposeful learning experience focused upon some socially significant understanding that will modify the behavior of the learner and enable him to adjust to a life situation more effectively."[47]

DESIGN OF THE REPORT

Chapter one discusses the background of the study and provides justification for it. It attempts to provide the reader with background information concerning the importance of varying instruction and providing for individual differences, particularly the slow-learner.

Chapter two outlines a review of educational research and related literature directly or indirectly pertaining to map skill development and explains why there is a need for developing certain map skills in junior high school using the instructional package approach.

Chapter three describes the specific nature of the problem

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[46]Paul A. Friesen, Designing Instruction (Ottawa: Friesen, Kaye and Associates, Ltd., 1971), p. 1.

[47]Lavone A. Hanna, Gladys L. Potter and Neva Hagaman, Unit Teaching in the Elementary School (Toronto: Holt, Rinehart & Winston, Inc., 1963), p. 117.

to be dealt with throughout the project. It describes the steps to be followed in the actual development of the instructional package with a resumé of instructional development theory as it pertains to the development of the package. It also includes a detailed description of each step involved in the construction of the instructional package with an indication of the time encompassed to develop the package and test it.

Chapter four deals with the implementation and evaluation of the package described in Chapter three. It outlines limitations of the study and describes the ways in which the data obtained from the evaluative procedures were analyzed.

Chapter five includes final concluding remarks, some recommendations regarding possible revisions to the package, and topics for further studies arising from the investigation.

Chapter six is the final summary of the whole project with a resume of chapters one through five inclusive.

SUMMARY

Individual instruction is an educational necessity. As a consequence, the traditional textbook-lecture method of social studies instruction that has permeated Newfoundland schools for so long is now gravely inadequate. Students entering junior high school have tremendous variability in experiential background, needs, socio-economic status, learning procedures, and reading deficiencies. Regular classroom teachers can no longer depend on programs designed for large group instruction.

Rather, they now have to accommodate students with instructional needs not contained within the narrow confines of "average". To meet this challenge, teachers from every educational level must be prepared to exploit any of the most recent advances in instructional development.

Several learning experts and psychologists have developed theories of instruction as they relate to learning. They all agree that learning theories and instructional theories are interdependent and that any attempt to develop instructional procedures should make use of what is known about learning as it pertains to the developmental nature of the learner.

Learning theorists also agree that there needs to be a sequence of learning events. There seems to be a general consensus of opinions that cognitive development proceeds in a series of hierarchical stages from the concrete to the more abstract and that instructional sequencing of subject matter content ought to be matched to a child's cognitive development level and not rigidly tied to specific grades.

Chapter 2

REVIEW OF RELATED LITERATURE AND RESEARCH

INTRODUCTION

Earlier in Chapter One it was stated that the purpose of this study was to develop and test an instructional unit to teach basic map reading skills, specifically latitude and longitude, to low-achievement students entering junior high school. According to the design of the present Newfoundland geography curriculum children are supposed to have already learned these skills. However, this is not always the case and as a consequence it is necessary to make provision for these individuals.

Many studies of children's map reading abilities have been conducted during the last three decades. Some studies have been directed towards a comprehensive assessment of children's map reading abilities; others towards a comprehensive program of instruction. Some studies have dealt with specific map reading skills such as measuring distance, determining location or direction, and the use of symbols. Still others have been concerned with specific areas of instruction such as how to teach scale, projections, and coordinate systems. In this chapter, a review of literature and empirical research is divided into three major sections because of the nature of the problem. Section one looks at geography as a discipline and geographic education as a

vital part of the total school program. Section two deals specifically with literature pertaining to the importance of map skills as an essential part of the social studies curriculum, and empirical research on how map skills are developed, with particular reference to latitude and longitude. Section three looks at research relating map skills to slow-learners, particularly those with a low reading ability, and how audio-visual materials can be employed as a method of teaching skills to low-achieving junior high school students.

GEOGRAPHY AND GEOGRAPHIC EDUCATION

It has been said that within the very broad area of social studies, history presents the drama of human events in time, whereas geography studies the stage on which these events take place. The very nature of geography, however, is very complex and thereby very difficult to define precisely. Nevertheless, it may be said that the subject is broadly conceived by geography teachers, geography educators, and academic geographers alike to be one that, in MacKinder's words, can do much to "bridge the gap...between the natural sciences and the study of humanity."[48] or, somewhat similarly, that has been identified by Hartshorne as an integrating science cutting through the physical and social sciences.[49]

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[48] Halford J. MacKinder, "On the Scope and Methods of Geography," Proceedings of the Royal Geographical Society, Vol. 9 (1887), p. 145, cited in R. G. Honeybone, "Balance in Geography and Education," Geography and The Integrated Curriculum: A Reader, ed. Michael Williams (London, England: Heinemann Educational Books, 1976), p. 85.

[49] Richard Hartshorne, The Nature of Geography (Lancaster, Pa.: Association of American Geographers, 1939), p. 147.

The concept of geography as a meaningful explanation of the relationship between places and peoples appears to be the central theme running through the writings of most well known geographers. Vidal de la Blache sees geography as "the science of places not (that) of men."[50] Broek also explains that geography is concerned with "the character of place, ...the integrated whole of a people and its habitat, and the interrelations between places."[51]

Scarfe also stresses the concept of place when he explains that the truly geographical angle "is the interacting influence of places and people...."[52]

Graves states that geography as a study of man and his relationship to the land is the "prevailing paradigm of geography."[53] He later goes on to proclaim that because the prevailing paradigm for geography 'is the 'areal differentiation' or regional synthesis model it fits well into a justification for geographical education.[54] Other geographers

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[50]Paul Vidal de la Blache, quoted in S. W. Woolridge and W. G. East, The Spirit and Purpose of Geography, 3rd ed., revised (London, England: Hutchinson, 1966), p. 25.

[51]Jan O. M. Broek, Geography: Its Scope and Spirit (Columbus, Ohio: Charles E. Merrill Publishing Co., 1965), p. 3.

[52]Neville V. Scarfe, Geography in School, Geographic Education Series No. 5 (Normal, Illinois: National Council for Geographic Education, 1965), p. 1.

[53]Norman J. Graves, Geography in Education (London, England: Heinemann Educational Books, 1975), p. 82.

[54]Ibid., p. 84.

such as Pattison argue for the spatial organization pattern.[55] These differing paradigms of geography have led Graves to draw the following conclusion regarding geography's position in the very broad field of education:

> If one takes a view of education as an initiation into worthwhile activities, then both paradigms are relevant; but if one views education as having an essentially instrumental role in economic and social life, then the spatial organization paradigm may seem more relevant and so the broad aims of geographical education may be seen as those of teaching those skills, concepts and principles subsumed within that paradigm.[56]

Whatever the paradigm, how else can teachers help students understand the ideas of spatial location, spatial association, and spatial interaction than through the structured context of geographic education? James makes a strong pitch for the inclusion and importance of geography in education when he says:

> If geography ceases to introduce students to a systematically organized picture of the world in which we live, some other subject matter will be called upon to fill this need.[57]

Howarth maintains that "...geography, in conjunction with all other school subjects, is in a position to make valuable contributions

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[55] W. D. Pattison, "The Educational Purposes of Geography," Evaluation in Geographic Education, ed. D. G. Kurfman (Belmont, California: Fearon Publishers, 1970),

[56] Norman J. Graves, Geography in Education (London, England: Heinemann Educational Books, 1975), p. 99.

[57] Preston E. James, "Introductory Geography: Topical or Regional," Journal of Geography, LXVI (February, 1967), 53.

toward the development of social responsibility upon an international scale."[58]

Research by Wise in the secondary grammar and comprehensive schools in England and Wales in 1972 confirmed that geography is an important subject in the curriculum. In total time allocation, it is surpassed only by mathematics, English, and French.[59]

Although Wise suggests that geography "cannot be regarded essentially as a subject having functions normally ascribed to social studies curricula,"[60] he does agree with Long and Roberson who have stated that geography is necessary to a "...knowledge of other ways of life, of conditions of living, and of world interdependence...."[61]

McTeer conducted research into high school students' attitudes toward geography. Although his findings suggest a less than positive attitude toward the subject, McTeer blames the attitude on instructional deficiencies and maintains that:

> ...an understanding of geographical concepts, principles, and ideas are necessary if a student is to attain those goals and objectives outlined for the social studies program in

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[58] O. J. R. Howarth, "The Commonwealth in the Geography Syllabus," Geography, XXXIX (1954), 5-13.

[59] John H. Wise, "Geography in the Secondary Grammar and Comprehensive Schools of England and Wales: A Brief Appraisal" (paper presented to a meeting of the Commission for Geography in Education, twenty-second International Geographical Congress, Toronto, Canada, August, 1972. ERIC ED 066 362.

[60] Ibid.

[61] M. Long and B. S. Roberson, Teaching Geography (London, England: Heinemann Educational Books Ltd., 1966), 34.

secondary schools.[62]

McAuley stresses the importance of geography to social studies especially in developing a sense of place:

> Geography helps give structure to social studies. Without this structure social studies has no proper explanation of the interrelationships between peoples and the earth.[63]

Thus, it would appear that it is geography, as a field of learning, to which the social studies teacher can turn for meaningful ways to develop skills in spatial relationships.

THE NEED FOR MAP SKILLS

Skill development is a vitally important component of the social studies curriculum. Jarolimek explains that "skills are the basic tools of learning."[64] Jarolimek goes on to say that:

> Inadequately developed skills foreshorten the opportunity to continue learning and lead invariably to poor achievement in the social studies. It is simply impossible for a

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[62] J. Hugh McTeer, "High School Students' Attitudes Toward Geography," Journal of Geography, LXXVIII, 2 (February, 1979), 55.

[63] J. D. McAuley, "Maps and Globes in the Elementary School Program," Journal of Geography, LIX (December, 1960), 431.

[64] John Jarolimek, "The Psychology of Skill Development," Skill Development in Social Studies, ed. Helen McCracken Carpenter, Thirty-third Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1963), p. 18.

student to be deficient in skills and to excel in social studies.[65]

As early as 1953 Carpenter emphasized the importance of skill development in social studies:

> The teaching of skills cannot be handled in an incidental or peripheral manner if good results are anticipated. Rather, it must be considered as one of the central purposes of social studies instruction.[66]

Later in 1967 Carpenter wrote an article once more stressing the importance of skill development:

> Among the several classifications of goals to which social studies teaching is directed, agreement is general that the development of skills should receive major attention.[67]

Many others have stressed the need for developing skills in geography. Kennamer, for example, points out that "...many different types of skills will be needed for an active and inquiring student."[68] Kohn emphasizes that a major objective in the teaching of geography is

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[65]John Jarolimek, "The Psychology of Skill Development," Skill Development in Social Studies, ed. Helen McCracken Carpenter, Thirty-third Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1963), pp. 18-19.

[66]Helen McCracken Carpenter, Skills in Social Studies, Twenty-fourth Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1953), p. 28.

[67]Helen McCracken Carpenter, "The Role of Skills in Elementary Social Studies," Social Education, XXXI, 3 (March, 1967), 220.

[68]Lorrin Kennamer, Jr., "Geography in the Middle Grades," Social Education, XXXI, 7 (November, 1967), 617.

"to help the learner acquire a working understanding of the essential geographic skills."[69]

Jarolimek stresses the need for skill development and points out that without properly developed skills pupils fall further and further behind in their school achievement and may even reach a point where they eventually drop out of school:

> There can be no doubt that well developed skills enhance the ability to do other school-related tasks. Conversely, poorly developed skills result in arrested school progress. Pupils who are off to a poor start in their skill development in primary grades fall further and further behind in their overall achievement. Eventually the deficit accumulates to a point that becomes overwhelming to the pupil and nearly impossible for him to overcome. School dropouts at the high school level invariably present histories of skill deficiencies that can be traced to the earliest grades in school.[70]

An examination of geography textbooks from grades four to eight in Newfoundland schools reveals a prolific array of maps, charts, diagrams, graphs, and tables which should provide ample opportunity for the student reaching junior high school to have developed geographic skills. A study by Jones, however, indicates that the main mode of instruction in geography in Newfoundland schools is expository. This indicates that there is a lack of opportunity for students to be actively involved in developing geographic skills.

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[69]Clyde F. Kohn, "General Objectives of Geography," Methods of Geographic Instruction, ed. John W. Morris (Waltham, Massachusetts: Blaisdell Pub. Co., 1968), p. 23.

[70]John Jarolimek, "Skills Teaching in the Primary Grades," Social Education, XXXI, 3 (March, 1967), 222.

[71]F. C. Jones, Geographic Teaching in Canadian Schools St. John's, Nfld.: Memorial University of Newfoundland, 1978).

At the end of her discussion of existing map skills instruction, Meyer suggested that "present map skills instruction using textbooks may only be producing a rote type of false mastery of skills rather than real understanding of maps and mastery of skills."[72]

Nowhere is the need for developing geographic skills greater than in the area of map skills. As Michaelis explains:

> In social studies, maps and globes are used to locate places in the community, state, nation, and other lands, such as parks, resources, products, ports, water bodies, historical sites, cities, transportation routes, mountain ranges, and population distribution, and to find distance and time between places, along travel routes, and across areas. They are also used to determine location from place to place, of travel routes, of the flow of rivers, of migration, and to compare selected regions with reference to area, population, resources, water bodies, landforms, products, occupations, and urban centers.
>
> In addition, maps and globes are used to interpret data needed to answer questions and test hypotheses, and to discover relationships and draw inferences regarding climate and living conditions, industries and resources, terrain and travel routes, and location of cities in relation to topography.[73]

James and Crape also emphasize the value of maps:

> In teaching, maps have considerable value in that they can be used to fulfill a variety of roles: as motivation devices to create interest in a subject or concept, as tools for testing purposes, as sources for geographic information

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[72] Judith M. W. Meyer, "Map Skills Instruction and the Child's Developing Cognitive Abilities," Journal of Geography, LXXII, 6 (September, 1973), 34.

[73] John U. Michaelis, Social Studies for Children in A Democracy, 6th ed. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1976), p. 408.

and as vehicles for transmitting primary and secondary information.[74]

Hawkins reports a study by Askov and Kamm who analyzed several textbook series and found that reference to skill development was incidental rather than systematic and that many map skills were introduced, but only some of them were systematically developed.[75]

Considerable research has been conducted in the area of map skills during the last thirty years and for decades the need for map skills development has been a topic of debate by writers directly or indirectly connected with geographic education.

As early as 1948, Whittemore stressed the need for map skills when he said that "when the course is one of integrated social studies, a development of map skills must have a place."[76] Over the years many others have stressed the need for map skills development. Nieman,[77]

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[74]Linnie B. James and La Monte Crape, Geography for Today's Children (New York: Appleton-Century-Crofts, 1968), p. 98.

[75]Michael L. Hawkins, "Map and Globe Skills in Elementary School Textbooks," Journal of Geography, LXXVI, 7 (December, 19770, 261.

[76]Thomas K. Whittemore, "Maps," Geographic Approaches to Social Education, ed. Clyde F. Kohn, Nineteenth Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1948), p. 18.

[77]Clara W. Nieman, Teacher's Manual: Effective Use of Maps and Globes, and Atlases in the Classroom (Indianapolis, Indiana: The George F. Cram Co., 1951), p. 5.

Block, et al.,[78] and Kohn[79] point out that learning to read a map is an absolutely necessary skill that must not be underestimated.

McAuley points out that map skills are vitally important to an understanding of spatial relationships in social studies:

> Maps and globes are valuable and necessary tools of the social studies. They help develop concrete understandings of spatial relationships and arrangements of location and harmony...They are the keystone to proper teaching of geographic concepts.[80]

Hardwick, et al.,[81] and Miller[82] maintain that maps are a very important tool of the geographer and that map skills are a basic aspect of geographic thinking.

Grandy found that map exercises were judged most useful in geography instruction. The opinions of a selected sampling of California

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[78]Millard H. Block, and others, "Critical Thinking and Problem Solving," Social Studies in Elementary Schools, ed. John U. Michaelis, Thirty-second Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1962), p. 163.

[79]Clyde F. Kohn, "Interpreting Maps and Globes," Skills in Social Studies, ed. Helen McCracken Carpenter, Twenty-fourth Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1953), p. 146.

[80]J. D. McAuley, "Maps and Globes in the Elementary School Program," Journal of Geography, LIX (December, 1960), 433.

[81]Francis C. Hardwick, and others, Teaching History and Geography (Toronto: W. J. Gage Ltd., 1964), p. 182.

[82]Elbert E. Miller, "Map Reading Abilities of College Freshmen Compared with those of Ninth Graders," Journal of Geography, LXIV (November, 1965), 367.

public high school teachers as to the utility of various methods, techniques, or devices in teaching geography indicated that of a sample of thirty-eight teachers, thirty-one felt that map exercises in which students make maps, locate places, make interpretations, etc., were very useful. Only one felt that they were impractical. Thirty-three percent of the group also indicated using map exercises often.[83]

Moore and Owen,[84] Towler and Nelson,[85] and Wilms[86] have gone so far as to say that the ability to use maps is one of the most important skills to be developed in geographic education.

The Geographical Association explains that map skills are so important that "...no sound geographical work can be undertaken without their regular use."[87] The Association also points out that true

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[83]Willard E. Grandy, "Instructional Patterns and Materials in the Teaching of Geography," Journal of Geography, LXIV, 2 (February, 1965), 73.

[84]Evelyn Moore and Edward E. Owen, Teaching the Subjects in the Social Studies (Toronto, Ontario: The Macmillan Co. of Canada Ltd., 1966), p. 115.

[85]John O. Towler and L. D. Nelson, "The Elementary School Child's Concept of Scale," Journal of Geography, LXVII (January, 1968), 24.

[86]Douglas C. Wilms, "Media Review: Where and Why," Journal of Geography, LXXIII, 6 (September, 1974), 48.

[87]Geographical Association, Teaching Geography in Junior Schools (London, Great Britain: Jerrold and Sons Ltd., 1967), p.30.

geographical teaching in the junior high school begins only when children are able to understand and use maps.[88]

A publication of the Newfoundland and Labrador Department of Education called Map and Globe Skills: Kindergarten - Grade Seven stresses the point that "maps and globes are tools of instruction essential to the understanding of geography and of the other areas in the social studies program."[89]

Other research studies by Coons,[90] Crabtree,[91] Muir and Blaut,[92] and Hart[93] all make the basic assumption that mapping is especially significant because maps are central to a depiction of spatial relations.

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[88]Geographical Association, Teaching Geography in Junior Schools (London, Great Britain: Jerrold and Sons Ltd., 1967), p. 30.

[89]Division of Curriculum, Map and Globe Skills, K-7 (St. John's, Newfoundland: Department of Education, n.d.), p. 1.

[90]M. M. Coons, "Map Reading in the Second Grade," (unpublished Master's thesis, University of California at Los Angeles, 1966).

[91]Charolette Crabtree, Children's Thinking in the Social Studies. Part I, Some Factors of Sequence and Transfer in Learning the Skills of Geographic Analysis (Los Angeles: Graduate School of Education, University of California at Los Angeles, 1974).

[92]M. E. Muir and J. M. Blaut, "The Use of Aerial Photographs in Teaching Mapping to Children in the First Grade: An Experimental Study," Minnesota Geographer, XXII, 2 (June, 1970), 4-19.

[93]R. A. Hart, "Aerial Geography: An Experiment in Elementary Geography," (unpublished Master's thesis, Clark University, 1971).

DEVELOPING MAP SKILLS

Though the emphasis on map skills has increased during the past thirty years, little attention has been paid to the creation of an organizational and developmental framework for the skills. Most of the skill outlines that have been devised suggest that there is a vast number of unrelated map skills, rather than that there are only a few fundamental skills, each with a number of related subskills. In addition to overlooking such a developmental framework, existing instructional materials tend to ignore important background concepts that a child must understand before undertaking a particular skill. Standardized tests seem to parallel the instructional materials in that they treat the skills as an array of unrelated tools the child should acquire. The skills seem to be selected randomly for assessment.

A survey by Otto, Kamm, and Weible showed that up to 1972 little thought had been given to either the interrelationship existing between the map skills or to the related concepts. Teaching of skills proved to be incidental rather than systematic.[94]

Joyce attempted to develop a scheme for grade placement of map and globe skills. Studies by Joyce indicated that the early introduction of map and globe concepts and skills is more feasible than generally supposed and that systematic instruction is preferable to casual and

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[94] Wayne Otto, Karlyn Kamm, and Evelyn Weible, Wisconsin Design for Reading Skill Development: Rationale and Objectives for the Study Skills Element, Report on the Wisconsin Design for Reading Skill Development, Wisconsin Research and Development Center for Cognitive Learning (Madison, Wisconsin: University of Wisconsin, 1972), p. 9.

incidental treatment.[95]

Rushdoony also proposed a rather detailed "gradation of map-reading skills", based on map skills research he had reviewed.[96] With several notable exceptions, his ordering of map skill development coincides with the literature on developmental and learning theories cited earlier in chapter one of this report.

Arnsdorf reports findings similar to Rushdoony's. He finds that a youngster can learn many map skills earlier than was previously thought, when the concepts and subskills leading to these skills are effectively taught developmentally, systematically, and functionally at the level of a child's perception and understanding.[97]

Cox, like Rushdoony, has also made recommendations concerning a map skills sequence.[98] Both Cox and Rushdoony agree that there is a progressive improvement in the use of maps by grade level; that deficiencies in map conceptions are due to lack of systematic instruction

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[95]William W. Joyce, "The Development and Grade Placement of Map and Globe Skills in the Elementary Social Studies Program," (unpublished Doctoral dissertation, Northwestern University, 1964).

[96]Haig A. Rushdoony, "A Child's Ability to Read Maps: Summary of the Research," Journal of Geography, LXVII (April, 1968), 215.

[97]Val E. Arnsdorf, "Geographic Education: Principles and Practices in the Primary Grades," Social Education, XXXI (November, 1967), 613.

[98]Carlton W. Cox, "Suggested Map Skill Sequence," What Can Children Learn in Geography? A Review of Research, Marion J. Rice and Russell L. Cobb (Boulder, Colorado: ERIC Clearinghouse for Social Studies/Social Science Education and Social Science Education Consortium, Inc., 1978), p. 105.

more than to lack of aptitude; and that there has been much emphasis on what children actually know rather than on what they might learn as a result of sequentially planned and systematic instruction.

Crabtree reported a study of map skills instruction in 1974 in which she examined the appropriateness of the sequencing of skills. The study revealed that student mastery of the basic analytic elements of geography would facilitate continued learning of higher-order concepts and processes.[99]

Kennamer,[100] Regan and McAuley,[101] Hanna, et al.,[102] and Askov and Kamm[103] all indicate that more effort is required in formulating a developmental framework for teaching geography skills.

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[99] Charlotte Crabtree, Children's Thinking in the Social Studies, Part I, Some Factors of Sequence and Transfer in Learning the Skills of Geographic Analysis (Los Angeles: Graduate School of Education, University of California at Los Angeles, 1974).

[100] Lorrin Kennamer, Jr., "Geography in the Middle Grades," Social Education, XXXI, 7 (November, 1963), 615-617.

[101] W. B. Regan and J. D. McAuley, Social Studies for Today's Children (New York: Meredith Publishing Co., 1964).

[102] P. R. Hanna, et al., Geography in the Teaching of Social Studies (Boston: Houghton-Mifflin Co., 1966).

[103] E. N. Askov and K. Kamm, "Map Skills in the Elementary School," Elementary School Journal, LXXV (November, 1974), 112-121.

Meyer has used the ideas of Sabaroff,[104] Pattison,[105] and Rushdoony[106] to develop a hierarchically defined sequential structure for map skills instruction (Figure 1). According to this sequential structure for map skills instruction, "A child's learning of map skills is expected to progress up the hierarchy from the bottom to the top, with lower content unit being prerequisites for higher level units."[107]

According to Meyer's sequence, before a child can accurately determine distance from a map he must be able to "conserve" distance and observe carefully. To determine direction and location on maps, the child needs similar prerequisite abilities. For example, he needs to be able to apply the notion of a reference system like latitude and longitude for dealing with location problems.

Location has two subdivisions of skills: grid and direction. The progression in grid is from using a simple picture grid to using latitude and longitude to locate points.

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[104] R. Sabaroff, "Map Interpretation in the Primary Grades," Elementary School Journal, LXIV (November, 1963), 59-67.

[105] William D. Pattison, "Territory, Learner, and Map," Elementary School Journal, LXVII (December, 1966), 146-153.

[106] Haig A. Rushdoony, "A Child's Ability to Read Maps: Summary of the Research," Journal of Geography, LXVII (April, 1968), 213-223.

[107] Judith M. W. Meyer, "Map Skills Instruction and the Child's Developing Cognitive Abilities," Journal of Geography, LXXII, 6 (September, 1973), 32.

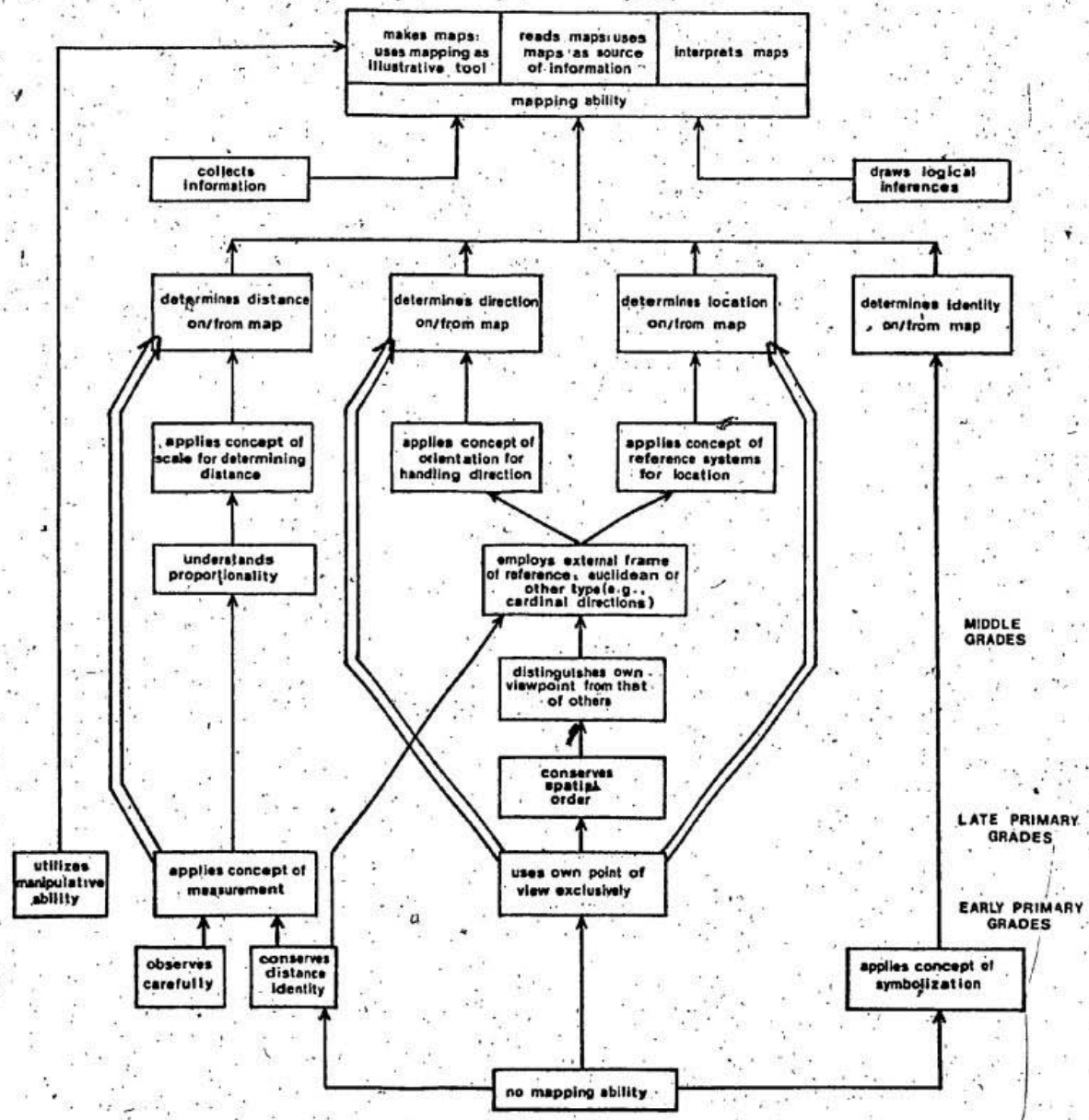

Figure 1. Sequential Structure for Map Skills Development. Judith M. W. Meyer, "Map Skills Instruction and the Child's Developing Cognitive Abilities," Journal of Geography, LXXII, 6 (September, 1973), 32.

In reviewing recent research on this topic,[108] the writer found that there were significant efforts in the early 1950s to define a set of map reading skills for children and to test their ability to perform these skills. In 1953 Wagner compiled a list of skills she believed appropriate for sixth grade children.[109] One of the things she tested was general skill in using latitude and longitude. She used item analyses on the data collected and concluded that the students she tested did not have this and other specific skills and knowledge needed to interpret map symbols. She concluded that the poor performance on the part of the students was due to lack of reinforcement rather than lack of instruction in earlier grades.

A decade later in 1965 Bartz completed a major study of map design and children's reading ability.[110] She tested 233 children in grades four through nine at four different locations: Albuquerque, New Mexico; Oak Park, Illinois; Suring, Wisconsin; and Union, New Jersey.

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[108] An examination of the literature shows that studies in Canada, Great Britain, and Australia on the use of map skills in primary, elementary and high school are not very extensive. An ERIC Computer Search (BRS) was made using the following search mode: map skills, location skills, geography skills -- Great Britain, Canada, and Australia.

[109] L. D. Wagner, "Measuring the Map Reading Ability of Sixth-Grade Children," Elementary School Journal, LIII (February, 1953), 338-344.

[110] Barbara Bartz, Map Design for Children (Chicago: Field Enterprises Educational Corporation, 1965), cited in Carlton W. Cox, "Children's Map Reading Abilities with Large Scale Urban Maps," (Doctoral dissertation, University of Wisconsin at Madison, 1977). Duplicated as Publication no. 78-4, Geography Curriculum Project, University of Georgia, 1978.

The children were interviewed individually for about fifteen to thirty minutes each. Test questions were based on eleven maps from the 1964 World Book Atlas ranging in scale from 1:1,000,000 to 1: 42,000,000. The questions covered eleven different types of map reading skills:

1. General
2. Latitude and longitude
3. Direction
4. Scale
5. Symbol Comprehension
6. Comprehension of layer-tints
7. Political areas
8. Names and lettering
9. Insets
10. Generalizations
11. Miscellaneous

The purpose of the test was first to determine what the children understood of symbolization in general, as well as what they knew of specific symbols; and second, to gain some insight into the general problem of how children read maps.

The results of the test showed that children were familiar with latitude and longitude but were unable to apply the concepts to problems of location. They also understood cardinal directions, but had difficulty with map orientations other than that of "north at the top." Generally, the directions east and west were more difficult to work with than north or south.[111]

A research study by Rushdoony, as alluded to earlier on page forty, lists six categories representative of map skills that he tested:

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[111] Barbara Bartz, Map Design for Children (Chicago: Field Enterprises Educational Corporation, 1965), cited in Carlton W. Cox, "Children's Map Reading Abilities with Large Scale Urban Maps," (Doctoral dissertation, University of Wisconsin at Madison, 1977). Duplicated as Publication no.78-4, Geography Curriculum Project, University of Georgia, 1978, p. 54.

a) Size and shape
b) Orientation and direction
c) Location
d) Distance
e) Symbols
f) Map inference

Rushdoony summarized the results of his research by drawing three general conclusions:

1. There tends to be a grade-to-grade progression in children's ability to read maps.

2. Children's errors and misconceptions tend to be at least in part related to lack of any extensive systematic teaching of map reading.

3. There tends to be a stress on what children know or do not know rather than on what they can learn through systematic instruction.[112]

A study by Towler into the elementary school child's concept of reference systems indicated that it is important for a child at an early age to be able to understand and use a system of references. He suggests that such an understanding is necessary for a child to orient himself accurately in the real three-dimensional world and unless he has some concept of how spatial relations may be described with reference to one another, it will be exceedingly difficult for him to understand the theoretical reference system of latitude and longitude.[113]

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[112] Haig A. Rushdoony, "A Child's Ability to Read Maps: Summary of the Research," Journal of Geography, LXVII, 4 (1968), 213-221.

[113] John O. Towler, "The Elementary School Child's Concept of Reference Systems," Journal of Geography, LXIX, 2 (February, 1970), 89-93.

Even Trueman makes the comment that "reading, drawing, plotting, and interpreting maps are all key skill areas in geography."[114] He also points out that "the frequent use of longitude and latitude also reinforces globe skills."[115]

The research conducted by Otto, Kamm, and Weible indicated that by grade four (which is referred to as Level E in their hierarchy of map skills from kindergarten to grade six) students should be able to use (a) lines of latitude as referents for describing general locations and (b) lines of longitude as referents for describing general directions.[116]

Carpenter,[117] Harris,[118] and Whipple[119] suggest that by the inter-

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[114] R. W. Trueman, Teacher's Guide for Introducing Earth - Part I (Toronto, Ontario: The Macmillan Co. of Canada Ltd., 1979), p. 8.

[115] Ibid.

[116] Wayne Otto, Karlyn Kamm, and Evelyn Weible, Wisconsin Design for Reading Skill Development: Rationale and Objectives for the Study Skills Element, Report on the Wisconsin Design for Reading Skill Development, Wisconsin Research and Development Center for Cognitive Learning (Madison, Wisconsin: University of Wisconsin, 1972).

[117] Helen McCracken Carpenter, Skills in Social Studies, Twenty-fourth Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1953.

[118] Ruby M. Harris, The Rand McNally Handbook of Map and Globe Skills (Chicago: Rand McNally and Co., 1960).

[119] Gertrude Whipple, How To Introduce Maps and Globes: Grades One Through Six, How to do it Series, No. 15 (Washington, D. C.: National Council for the Social Studies, 1967).

mediate grades (4-6) students should be capable of finding location of specific places in terms of latitude and longitude.

Kirman reports a study by Brown, et al., concerning the capacity of elementary children to deal with maps. In a study in schools in the areas of Gloucester, London, and Nottingham, boys and girls from ages eight to fifteen years old were examined on a series of map questions. Results of the study suggested that by eight years old children should be able to understand the concept of direction and use conventional signs; at about fourteen years of age they should be able to comprehend scale and other more difficult items.[120]

Cox[121] conducted a study to examine the ability of elementary school children to perform certain map reading skills on large scale urban maps. A test consisting of four maps accompanied by nineteen multiple-choice questions was administered to 349 central Illinois students in grades two, four, and six. All four test maps showed the same location. Test questions were grouped as either perceptual skills or legend skills. Based on his research, Cox proposed a sequence of map reading skills which are to be taught at much earlier age levels

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[120] T. W. Brown, et al., "An Investigation Into the Optimum Age at Which Different Types of Map Questions May Best be Set to Pupils in the Teaching of Geography." International Geographical Union, 1970, in Joseph M. Kirman, "The Use of Infra-red False Color Satellite Maps by Grades 3, 4, and 5 Pupils and Teachers," (Edmonton, Alberta: Alberta Advisory Committee on Educational Research, 1976). ERIC ED 134 494.

[121] Carlton W. Cox, Children's Map Reading Abilities With Large Scale Urban Maps, (Doctoral dissertation, University of Wisconsin at Madison, 1977). Duplicated as Publication no. 78-4, Geography Curriculum Project, University of Georgia, 1978.

than that proposed by the authors of the Wisconsin Design for Reading Skill Development--Otto, Kamm, and Weible. He suggests that by ages eight to ten the child can begin to learn about the globe and various geographic concepts such as latitude and longitude.[122]

The booklet Map and Globe Skills: K-7 published by the Newfoundland and Labrador Department of Education suggests that by grade five children should be able to understand the meaning of latitude and by grade six understand longitude to the point that they can use the grid system to find exact locations.[123]

If students are able to understand and use concepts of latitude and longitude by junior high school then it is presumed that they have progressed sequentially through the map skills hierarchy without any real problem and it is also assumed that the sequence of map skills development has not been interrupted somewhere along the way. However, these assumptions are always tenuous, particularly in the case of the low-achieving student or the student who has not been taught the prerequisite skills in the elementary school.

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[122]Carlton W. Cox, Children's Map Reading Abilities With Large Scale Urban Maps, (Doctoral dissertation, University of Wisconsin at Madison, 1977). Duplicated as Publication no. 78-4, Geography Curriculum Project, University of Georgia, 1978.

[123]Division of Curriculum, Map and Globe Skills: K-7 (St. John's, Newfoundland: Department of Education, n.d.), pp. 29-35.

READING, MAP SKILLS, AND THE SLOW LEARNER

If the particular skills assigned to a grade typically build upon those supposedly mastered in the previous grade, then the slow-learning pupil is really in difficulty. He does not have the foundation in map skills, yet he is supposed to acquire new skills which are built upon that foundation. Sometimes a teacher may berate a pupil's previous teachers for failing to teach the skills (although those teachers actually may have exposed all pupils to the skills) and then proceed to teach as if the pupils had the skills anyway.

It is the teacher's responsibility to treat each student as an individually functioning organism and not to assume anything until the individual's background and prior learning have been assessed. Stendler and Blair point out the need for allowing for individual differences in a skills development program:

> One of the unfortunate aspects in the grade placement of skills is the assignment of the teaching of a particular skill to a particular grade and to that grade only. Educators forget that because of individual differences in rates of learning, not all pupils will master that particular skill at that grade level.[124]

A study conducted through the Newfoundland Provincial Curriculum Project was carried out during the 1974-1975 school year. Public meetings were held throughout the province and later a provincial conference was held in St. John's, Newfoundland, involving delegates from

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[124] Celia B. Stendler and Glenn M. Blair, "Human Development and Skill Development," Skills in Social Studies, ed. Helen McCracken Carpenter, Twenty-fourth Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies, 1953), p. 34.

all previous thirty-eight meetings. The purpose of the meetings was to give parents and the general public an opportunity to tell educational authorities "what Newfoundland schools should teach". The report of the conference gives as one of the main points raised that "school programmes need to be broadened to meet the diverse needs of students."[125]

Provision for individual differences in the social studies has too often meant organizing the content into graded reading levels. Reading, which is one of the major determinants of learning, seems to predominate as the main instructional procedure in teaching skills. Covell found that achievement in social studies is directly related to the ability to read social studies material and also to the extent to which such reading is taught, and weaknesses in reading are the prime factor of failure in social studies.[126]

Since the textbook is still the major teaching source in most Newfoundland schools, the slow-achiever, who is reading two to four grades below his present grade level, will have great difficulty in comprehending explanations of map concepts such as latitude and longitude. These students require more concrete experiences wherein reading is deemphasized.

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[125]Government of Newfoundland and the N.T.A., Report of the Provincial Curriculum Project Conference (St. John's, Newfoundland: Government Printing Office, 1974), p. 39.

[126]Harold M. Covell, "Reading in the Social Studies," Social Education, XXI (January, 1957), 14-16.

Malpass refers to a study by Kirk who suggests that over thirty percent of school age children from the lower economic milieu may be classified as low-achievers and by the time these children reach junior high school approximately sixty percent are retarded in their reading by one to four years.[127]

A study by Rushdoony[128] was designed to ascertain which map reading skills recommended for children in fourth and fifth grades could be learned by children in third grade when advanced instruction was provided. The study was also designed to determine the relationships between achievement in map-reading and selected factors. The Iowa Tests of Basic Skills, W-1 (Work-Study Skills: Map Reading), Items 1-47, Forms 1 and 2 were administered to a representative sample of 129 third-graders from a west coast city randomly assigned to experimental and control groups. The experimental group received instruction in fourth- and fifth-grade map-reading skills for fifteen weeks during the spring semester of 1960, while the control group received instruction as outlined in the social studies teaching guide for grade three. Following the fifteen week instructional period the experimental group made significantly greater gains on nearly all items than did the control group. The data obtained were treated by means of item analyses of variance and covariance. The most fundamental implication from the

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[127] L. Malpass, C. Williams, and A. Gilmore, Programmed Reading Instruction for Culturally Deprived Slow Learners (Tampa, Florida: MacDonald Training Center Foundation, 1966).

[128] Haig A. Rushdoony, "Achievement in Map Reading: An Experimental Study," Elementary School Journal, LXIV, 2 (November, 1963), 70-75.

investigation, and one that is very relevant to this study, is that Rushdoony's findings indicate a high positive correlation between map-reading, intelligence, and reading ability.[129]

Research has generally shown that the readability level of most social studies texts is somewhat higher than their grade placement. Arnsdorf, in reporting research by Burrows of basal social studies materials, revealed that the readability level of social studies materials for the intermediate or higher grades is higher than the average reading ability of the children in the grades for which the books were intended.[130] Arnsdorf conducted a somewhat similar study to determine the levels of readability within elementary social studies texts. In his study, Arnsdorf analyzed four basic social studies series (twenty-five books). The series were selected with texts available at both the intermediate and primary grades. In the analysis two reading formulae were used: the Spache Readability formula for primary grade materials and the Dale-Chall formula for predicting readability for intermediate grades. Each text was divided into thirds and then analyzed by randomly selecting samples for each third until one hundred samples were drawn. Comparisons of readability estimates within and

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[129] Haig A. Rushdoony, "Achievement in Map-Reading: An Experimental Study," Elementary School Journal, LXIV, 2 (November, 1963), 74.

[130] Alvina Burrows, "Social Studies in the Elementary Schools," cited in Val E. Arnsdorf, "Readability of Basal Social Studies Materials," The Reading Teacher, XVI (January, 1963), 243-246. Also cited in Wayne L. Herman, Jr., Current Research in Elementary School Social Studies (Toronto, Ontario: The MacMillan Co., Ltd., 1969, 359-368.

between the twenty-five books in the four series were made through a study of the means, standard deviation, and range obtained. Differences between reading level of primary and intermediate grades were found to be large. The research indicated that reading is a problem to contend with, particularly in the case of the low-achiever.[131] "Most often," says Connor, "when a pupil is categorized as a slow-learner, what is really meant is that he is a slow reader."[132]

Davis reports research by Haffner who found that fifth grade social studies textbooks presented more difficult vocabulary than sixth grade books and concluded that social studies textbooks at both grade levels contained excessive vocabulary loads and concept builders.[133]

Arnold applied the Dale-Chall Readability Formula to the grade eight geography, Introducing Earth, Part II, presently being used in Newfoundland schools. He found that the reading level was much too high for less able students. One unit of the text was analyzed and rewritten at a lower level. Students using the rewritten textbook materials showed an improvement in attitudes and behaviors, and in

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[131] Val E. Arnsdorf, "Readability of Basal Social Studies Materials," The Reading Teacher, XVI (January, 1963), 243-246. Also cited in Wayne L. Herman, Jr., Current Research in Elementary Social Studies (Toronto, Ontario: The MacMillan Co., Ltd., 1969), 359-368.

[132] John R. Connor, "Reading Skill in the Social Studies," Social Education, XXXI, 2 (February, 1967), 104.

[133] O. L. Davis, "Textbooks and Other Printed Materials: Censorship," Review of Educational Research, XXXII, 2 (April, 1962), 130.

achievement on teacher-made tests.[134]

English investigated the readability level of social studies and science textbooks used in Newfoundland schools. The Dale-Chall Readability Formula was applied to twenty-one social studies and science textbooks used in grades four to eight. Results showed that only eight of the twenty-one textbooks were at a level of difficulty equal to or below the intended grade level. All of the books used in grades four to six were above the designated grade level. Thirteen of the textbooks had a level of difficulty from one to four years above the intended grade level.[135]

A study conducted by Lidberg into the reading comprehension difficulties in fourth, fifth, and sixth grade social studies textbooks revealed that the vocabulary load within the texts was generally heavy.[136]

It would appear from the research findings that many social studies textbooks are written at a level too difficult for the low-

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[134]Jeffery K. Arnold, "The Feasibility of Rewritten Subject Material at a Lower Reading Level in Geography for Less Capable Readers," (unpublished Master's thesis, Memorial University of Newfoundland, 1975), p. 53.

[135]Ida English, "A Readability Study of Social Studies and Science Textbooks," (unpublished Master's thesis, Memorial University of Newfoundland, 1974), p. 51.

[136]Richard G. Lidberg, "Reading Comprehension Difficulties in Fourth, Fifth, and Sixth Grade Social Studies Textbooks," (unpublished Doctor's dissertation, University of Iowa, 1965), Social Studies Dissertations, 1963-1969, ed. Richard E. Gross (Boulder, Colorado: ERIC Clearinghouse for Social Studies/Social Science Education, 1971), p. 143.

achieving student. A student reading at a grade three or four level cannot be expected to read and understand map concepts presented in textbooks written at a grade seven or eight level. He needs something other than the traditional textbook, with its major emphasis on reading material, to develop skills in map-reading that should, according to research conducted, have been developed in the intermediate grades.

MAKING PROVISION FOR THE SLOW-LEARNER

"It could be quite possible," says Chase, "to reach a high level of competence in social studies through a non-reading, non-writing curriculum."[137] While studies differ in conclusions drawn, there is general agreement that audio and visual materials properly used contribute to the learner's knowledge and skill development.[138]

Research by Arnsdorf to determine the effects of map overlays as an aid to building geographic understanding and map-reading skills proved that a "social studies instructional program employing map-overlays and encouraging pupils to raise questions accelerates pupil growth in map skill and geographic understanding."[139]

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[137] W. Lindwood Chase, "Individual Differences in the Elementary School," in Robert V. Duffey, "Helping the Less Able Reader," Social Education, XXV (April, 1961), 182.

[138] Val E. Arnsdorf, "Teaching Map Reading and Geographic Understanding with Projectuals," Journal of Geography, LXIII (February, 1964), 76.

[139] Ibid., p. 81.

Hasselriis conducted a study to discover the effects on reading skill and social studies achievement of three modes of presentation: simultaneous reading-listening, listening, and reading. It was concluded that simultaneous reading-listening and listening, when incorporated with study guides, may prove a worthy addition to the teaching methods used by junior and senior high school teachers of poor readers.[140]

Eilenstine investigated the efficacy of an auditory mode of learning for a disabled reader in a social studies program. In this case tape recordings were provided of all regular reading assignments. The approach allowed the disabled reader to continue in his or her academic learning rather than waiting for reading skills to develop. The results showed that input from the audio modality produced a significant increase in social studies achievement and that such a program may reap a variety of benefits for the disabled reader.[141]

Gritzner said that "particularly in the field of geography, verbal understanding at any class level can, and should be supplemented with visual impressions."[142]

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[140]Peter Hasselriis, "Effects on Reading Skill and Social Studies Achievement from Three Modes of Presentation: Simultaneous Reading-Listening, Listening, and Reading," Social Studies Dissertations 1963-1969, ed. Richard E. Gross (Boulder, Colorado: ERIC Clearinghouse for Social Studies/Social Science Education, 1971), pp. 89-90.

[141]Edwin L. Eilenstine, "The Disabled Reader: A Study of an Auditory Mode of Learning Procedure on Social Studies Achievement," (unpublished Doctor's dissertation, St. Louis University, 1973).

[142]Charles F. Gritzner, Jr., "The Geographical Filmstrip: A Neglected Teaching Aid in Higher Education," Journal of Geography, LXIV, 3 (March, 1965), 105.

McCunne and Pearson also stress the need for visual representation for the slow-learner:

> ...the trend toward increased visual representation is apparent in educational methods and materials because graphics facilitate formal learning. For most slow learners, visual presentation is the most effective avenue of learning.[143]

Probably one of the most relevant pieces of research to this project is a study by Richason involving the use of audiovisual tutorial methods in teaching geography at Carroll College. Richason explains that the purpose for introducing audiovisual methods at Carroll College was to improve the content of the beginning course in physical geography; to provide the necessary relevance in terms of both content and teaching strategy; to provide flexibility in class scheduling; to promote independent learning; to provide a course which would allow all students to compete favorably regardless of their high school preparation, cultural differences, or learning abilities. His findings indicated that almost eighty percent of those enrolled in the audiovisual tutorial program felt that this method of instruction was superior to the traditional expository approach. Almost ninety percent indicated that the color slides and extra visuals aided their in-

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[143]George H. McCunne and N. Pearson, "Interpreting Material Presented in Graphic Form," Skill Development in the Social Studies ed. Helen McCracken Carpenter, Thirty-third Yearbook of the National Council for the Social Studies (Washington, D. C.: National Council for the Social Studies), p. 202.

terpretation of facts and concepts. More than two-thirds of the students felt that there was no loss of personal contact with the instructor. Ninety-two percent felt that the course elicited a type of student enthusiasm not present in traditionally presented courses. The findings also revealed that students learned faster and retained material longer than when subjected to expository methods only.[144]

Harrell explains that a somewhat similar approach was used at the Cubberley High School, Palo Alto, California in 1967-68. The science staff at Cubberley High School developed techniques for individualizing short multimedia units designed around the thirty-five millimeter projector correlated with written program and synchronized audio-taped instructional information. Harrell reports that the audiovisual project developed new ways of studying science. It provided more individualization of materials, and involved the students more personally in the learning program. Research findings revealed that students enrolled in the program found the usual pattern of traditional lectures, written busy work assignments, and straight textbook readings boring as compared with the audiovisual method.[145]

Dworkin and Holden conducted a study to find out whether the sound filmstrip was a good substitute for the classroom teacher. They found that there was no significant difference between the two but they

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[144]Benjamin F. R. Richason, Jr., "Teaching Geography by the Audiovisual Tutorial Method," Audiovisual Instruction, XV, 2 (February, 1970), 42.

[145]Burt Harrell, "Audiovisual Programs and Science Instruction," Audiovisual Instruction, XV, 2 (February, 1970), 25-26.

did conclude that sound filmstrips might be substituted for more expensive films and television.[146]

Kelley conducted a comparative study with first graders at Michigan City, Indiana, to study the effects of using filmstrips in teaching reading. He found that the youngsters who had the advantage of using filmstrips in their reading did significantly better on the Gates Primary Reading tests in word recognition. The teacher reported that filmstrips improved student interest, stimulated class discussion, helped fix basic vocabulary, encouraged the timid child, reduced teacher lesson-preparation time, and helped in phonetic and structural analysis.[147]

Chance used two hundred transparencies and eight hundred overlays in teaching engineering descriptive geometry to freshmen engineering students, one hundred four of whom were divided between this method and the usual instruction with the chalkboard. The transparency group did significantly better than the chalkboard group. Both instructors and

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[146]Solomon Dworkin and Alen Holden, "An Experimental Evaluation of Sound Filmstrips vs. Classroom Lecture," AV Communications Review, VIII, 3 (Spring, 1960), 157. Also in Journal of the Society of Motion Picture and Television Engineers, LXVIII (June, 1959), 383-385.

[147]T. D. Kelley, "Utilization of Filmstrips as an Aid in Teaching Beginning Reading," (unpublished Doctor's dissertation, Indiana University, 1961), cited in John A. Moldstad, "Selective Review of Research Studies Showing Media Effectiveness: A Primer for Media Directors," AV Communications Review, XXIII, 4 (Winter, 1974), 392.

students preferred this method.[148]

Other research by Stuck and Manatt revealed that the audio-tutorial method of instruction was significantly superior to the conventional (lecture) method of instruction.[149]

Allen suggested that filmstrips and slides have been found to be at least as effective as films because of special learning conditions for which they are especially suited, e.g., individual pacing and student participation.[150]

A review of literature and research in both general and specific education over the past decade leaves little doubt that increased sophistication in the use of technology and media by teachers is imperative in order to help special children cope with the regular educational program. It is obvious from the research that teachers need to adopt or construct instructional teaching-learning materials that effectively meet the needs of low-achieving students entering junior high school classes who lack the necessary prerequisite skills.

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[148] C. W. Chance, "Experimentation in the Adaptation of the Overhead Projector Utilizing 200 Transparencies and 800 Overlays in Teaching Engineering Descriptive Geometry Curricula," USOE Proj. 1960, cited in John A. Moldstad, "Selective Review of Research Studies Showing Media Effectiveness: A Primer for Media Directors," AV Communications Review, XXIII, 4 (Winter, 1974), 392.

[149] D. L. Stuck and R. P. Manatt, "A Comparison of Audio-tutorial and Lecture Methods of Teaching," Journal of Educational Research, LXIII, 9 (May-June, 1970), 414-418.

[150] W. H. Allen, "Research on New Educational Media: Summary and Problems," AV Communications Review, VII, 2 (1959), 83-96.

It is this particular group of students who comprise the primary target population for the development of the instructional unit (package) on "Map Reading Skills: Latitude and Longitude". The general objective for developing such a unit is to help a student reach a level of competency with a particular map skill so as to enable him to proceed with the majority of his classmates toward achieving the course objectives.

Chapter three explains how the instructional package was developed according to instructional development theory and provides a detailed explanation of each step in the instructional development sequence.

SUMMARY

On the basis of the related literature and empirical research a number of generalizations may be made about research carried out to date on map skills. First of all, a review of the geographic literature implies that the growth of children in map-reading concepts and skills roughly corresponds to learning theory and cognitive development theory. The literature also indicates that there is a need for skill development because skills are a vitally important component of the total social studies curriculum. This need is nowhere more apparent than in the area of map skills. However, the research indicates that there is a gap between actual and potential achievement due to unsystematic and uncoordinated instruction and that map skill development in schools does not follow any developmental sequence.

Attempts have been made by some investigators to develop a hierarchically defined sequence for map skills instruction. Based on this sequential structure, a child's map skills are expected to progress up the hierarchy, with lower content skills being prerequisite for higher level skills.

Other research suggested that it was important for a child at an early age to be able to understand a system of references (latitude and longitude), and that by grades four to six students are capable of locating specific places in terms of latitude and longitude.

Due to the nature of the learner and the fact that students are different, map skills development does not always progress in a sequential pattern. Therefore, it is unrealistic to assume that a common program will meet the needs of each individual. Teaching the slow-learner involves making adjustments and limiting expectations. These children need many concrete experiences. Research indicates that most geography and social studies textbooks are at a reading level much too high for the low-achieving student. Instruction must be based extensively on activities which de-emphasize reading.

Studies involving the use of media techniques suggest that low-achieving students, particularly those with a reading problem, profit more through the use of audio and visual modes of presentation of materials. Teachers must be prepared to construct media oriented instructional materials that will effectively meet the needs of these low-achieving students.

Chapter 3

INSTRUCTIONAL DEVELOPMENT PROCEDURES

INTRODUCTION

It seems reasonable to assume that most students, particularly slow learning students, are unable to cope with the traditional didactic lecture method of presentation of material. A child in a relatively low-ability classroom should not be doomed to failure simply because he has been placed at a level in the instructional sequence for which he has not mastered the necessary prerequisite skills.

The wide range of individual differences among a class of students makes it unlikely that group interaction alone will meet the varied needs of the students. Some type of adaptation in the instructional program is needed so that more effective learning strategies specific to the needs of each student can be provided.

Individualized instruction is receiving increased emphasis in the schools of this nation. The common theme that runs throughout the writings on this topic is that of developing a format that can provide for the maximum individual fulfillment of each student within the schools.

Instructional materials for developing prerequisite skills may be organized in many ways and presented in a wide variety of sequences. Varying the materials of instruction, however, is not enough to take

care of individual differences; teachers must also vary the methods.

Undoubtedly, the optimal organization and sequence of instructional materials for a particular skills development program must be matched to the level of cognitive development of the individual learner and timed to his or her rate of development. Thompson stresses this factor when he explains that:

> The learning potential of the student should influence the design of the system and the system goal. The level of expectation set for him in each area of instruction should be determined by his capacity for growth.[151]

In designing materials to meet the needs of individual students it is imperative that the development of instruction take into account the principles of human learning, specifically the conditions under which learning occurs, and maturational stages. Gagne and Briggs make this point when they say that "designing instruction must be based upon knowledge of how human beings learn."[152]

Along a somewhat similar vein, Bruner emphasizes the need for designing instruction in line with an individual's growth characteristics:

> Instruction is, after all, an effort to assist or shape growth. In devising instruction for the young, one would be ill advised indeed to ignore what is known about growth, its constraints and opportunities and a theory of instruction is in effect a theory of how growth and development are assisted by diverse means.[153]

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[151]Robert B. Thompson, A Systems Approach to Instruction (Hamden, Connecticut: The Shoe String Press, 1971), p. 9.

[152]Robert M. Gagne and Leslie J. Briggs, Principles of Instructional Development (New York: Holt, Rinehart & Winston, Inc., 1974), p. 5.

[153]Jerome S. Bruner, Toward A Theory of Instruction (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1966), p. 1.

A basic premise of educational technology, and, therefore, of instructional development, is that instruction is antecedently related to student learning. Hoban emphasizes this idea when he says:

> Regardless of achievements of the instructional developer, however, learning must still be done by the student. For this reason, the instructional developer must concern himself with theories of learning and theories of instruction.[154]

The reader is referred to chapter one, pages eight to eighteen, for a discussion of learning theory and instructional theory.

SYSTEMS ANALYSIS AND DESIGNING INSTRUCTIONAL PACKAGES

Since instructional development is a relatively new term in educational circles in Newfoundland, it needs to be defined before proceeding with the actual steps involved in the instructional development sequence.

Kemp defines instructional development as a process that establishes a way to examine an instructional problem and sets a procedure for solving it.[155]

Tickton, in developing a definition of instructional development, also stresses the learning process as part of the developmental procedure:

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[154] Dennis Hoban, "The Instructional Developer," AV Communications Review, XXII, 4 (Winter, 1974), 462.

[155] Jerrold E. Kemp, Instructional Design: A Plan for Unit and Course Development (Belmont, California: Lear Siegler Inc./Fearon Publishers, 1971), p. 7.

> ...it is a systematic way of designing, carrying out, and evaluating the total process of learning in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction.[156]

Merrill, in discussing the fundamentals of instructional design, explains that it is "the process of specifying and producing particular environmental situations which cause the learner to interact in such a way that a specified change occurs in his behavior."[157]

The definitions of Kemp and Merrill have much in common with others that are more psychologically oriented. For example, Lumsdaine says:

> Instruction is used as a generic term referring to any specifiable means of controlling or manipulating a series of events to produce modifications of behavior through learning. It is applicable whenever the outcome of learning can be specified in sufficiently explicit terms to permit their measurement.[158]

Instruction according to these points of view is a process in which a teacher presents subject matter to a learner so that he responds to it in a way that enables the teacher to determine the next item of information to be presented. In other words, the teaching-learning process can be viewed as "communication and control taking

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[156] Sidney G. Tickton (ed.), To Improve Learning: An Evaluation of Instructional Technology, II (New York: R. R. Bowker Co., 1971), p. 7.

[157] M. David Merrill (ed.), Instructional Design: Readings (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971), p. 1.

[158] A. A. Lumsdaine, "Instruments and Media of Instruction," Handbook of Research on Teaching, ed. N. L. Gage (Chicago: Rand McNally & Co., 1963), p. 584.

place between the components of a system."[159] In this case the system is composed of an instructor, a program of instruction, and the student, all in a particular pattern of interaction.

The term "systems approach" implies that scientific and experimental methods are applied in an orderly and comprehensive way to the planning of instructional tasks. Hunter defines it as "a structured process based on the study of all the variables related to a problem."[160]

Since the teaching-learning operation is a problem, the systems approach lends itself to a process leading towards an orderly solution. Implicit in the systems approach is the use of clearly defined educational objectives; experimentally derived data to evaluate the results of the system; and feedback to reinforce the learning of objectives and to continuously improve the system based on evaluation.

When students enter junior high school, most teachers assume that they have already developed or learned the necessary prerequisite skills, or as referred to under the systems approach, the required entry behaviors. This situation, as already alluded to in chapters one and two, is not necessarily true because students seldom arrive in homogeneous groups ready to be taught. The teacher's intuition may suggest to him that not all students are equally prepared to learn; nevertheless, because he feels that his job is to teach the prescribed

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[159] Lawrence M. Stolurow, "Models for Instructional Design: A Systems Approach to Instruction," Instructional Design: Readings, ed. M. David Merrill (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971), p. 38.

[160] Walter E. Hunter, A Systems Approach to the Instructional Process (St. Louis: Meramac Community College, 1970), p. 13.

curriculum, he moves on and does the best he can do. However, often the teacher's best usually assumes that most, but not all, students will achieve most, but not all, of the objectives of the course. To overcome this problem, the systems approach applied to instructional procedures requires that a pretest or pre-entry test be prepared and administered prior to students entering into a new course of study. The results of the pretest may lead to one of two conclusions:

1. The student possesses the necessary prerequisite (entry) skills.

2. The student does not possess the prerequisite (entry) skills.

Once the initial state of the learner is adequately determined by the pretest it becomes possible to select or develop instructional materials which will maximize the learner's potential for learning. Figures 2, 3, and 4 illustrate examples of the numerous flow charts that have been developed exemplifying the systems developmental process. Each model includes boxes which refer to sets of procedures and techniques which are employed by the instructional designer to:

1. assess students' needs (to determine what the problem really is);

2. select a solution (to meet the needs);

3. develop instructional objectives (if an instructional solution is indeed needed);

4. analyze tasks and content needed to meet the objectives;

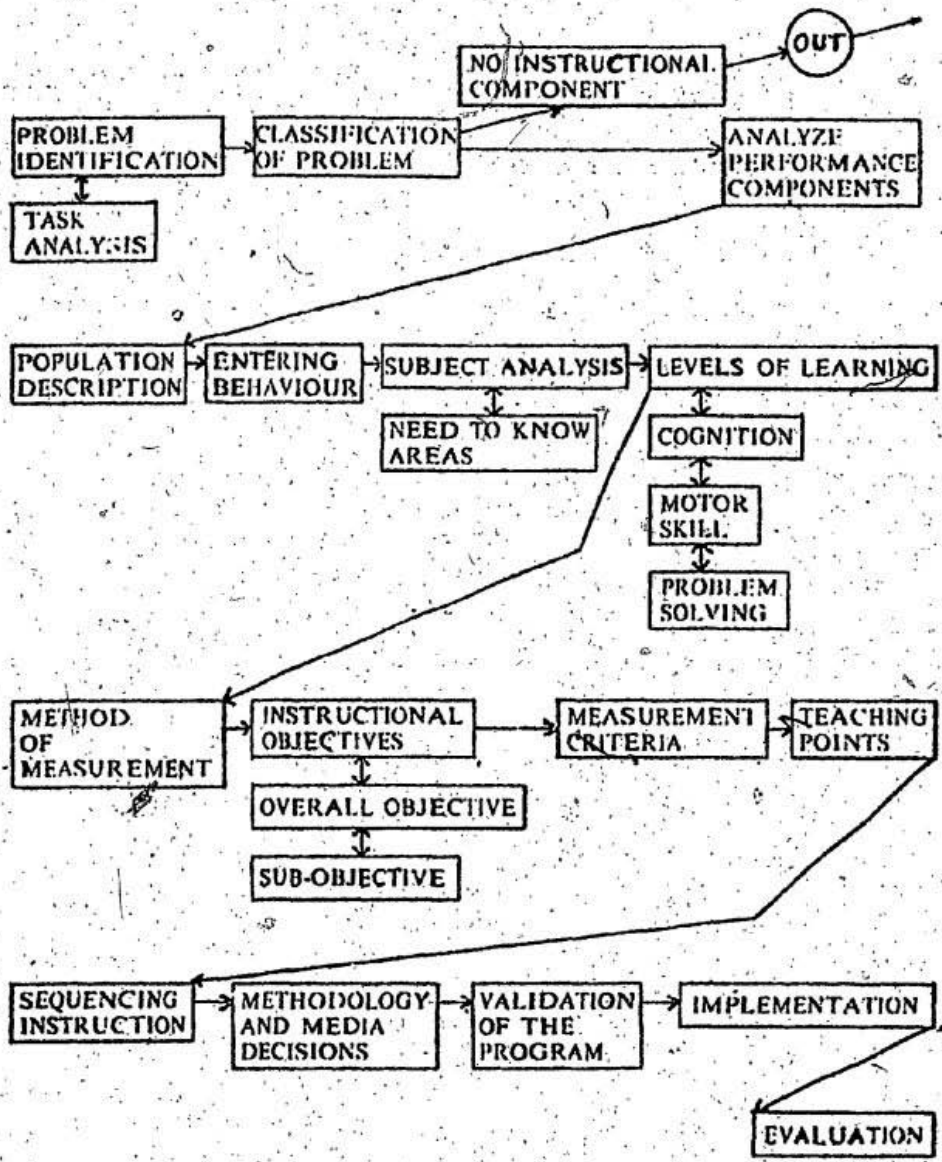
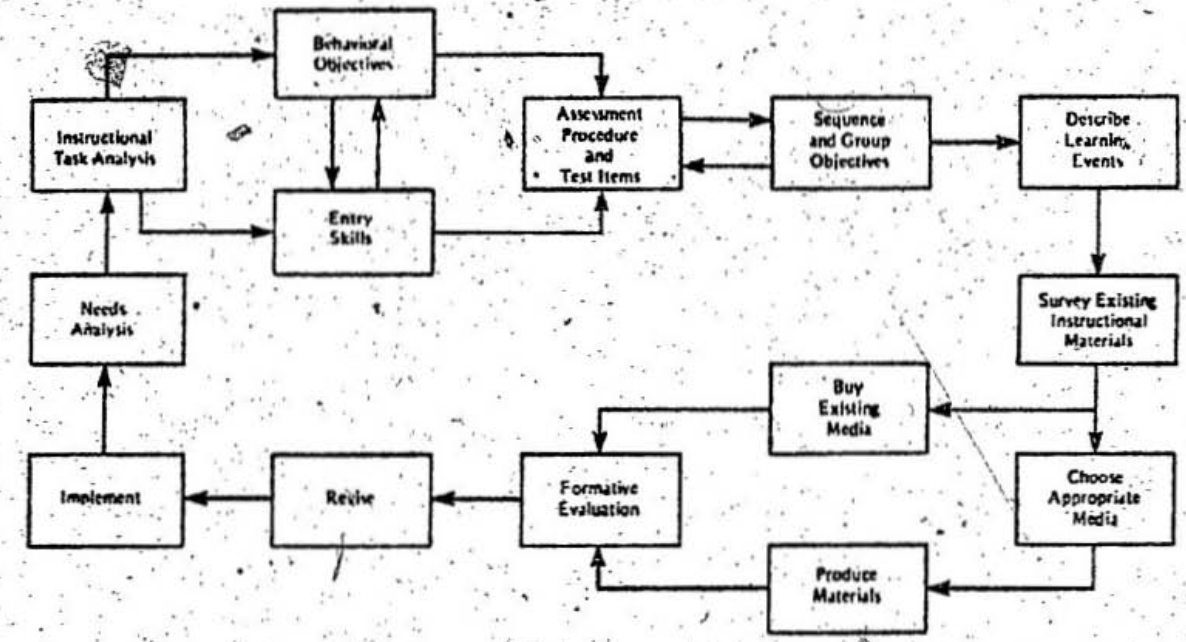


Figure 2. Systems Flow Chart. Paul A. Friesen, Designing Instruction (Ottawa: Friesen, Kaye and Associates Ltd., 1971), p. 3.



*Needs Analysis is usually thought to be the first step in instructional design. Proper use of the systems approach would allow entrance to the process at any step, with the cybernetic nature of the systems approach controlling the sequence of steps.

Figure 3. Systems Approach in Designing and Developing Instructional Systems. Robert Brain and Nelson J. Towle, "Instructional Design and Development: Accelerating the Process," Educational Technology, XVII, 2 (February, 1977), p. 13.

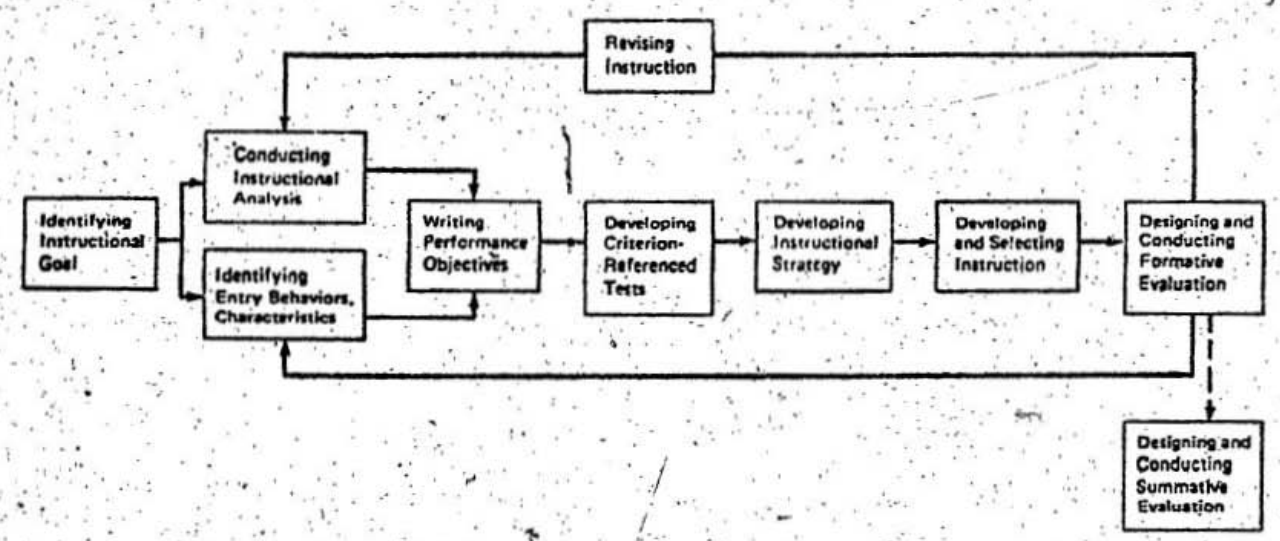


Figure 4. Systems Approach Model for Designing Instruction. Walter Dick and Lou Carey, The Systematic Design of Instruction (Glenview, Illinois: Scott, Foresman and Co., 1978), p. 9.

5. select instructional events;
6. select media;
7. develop or locate the necessary resources;
8. tryout/evaluate the effectiveness of the resources;
9. revise the resources until they are effective;
10. recycle continuously through the whole process.

Almost all the many papers, articles, and books which have been written on the subject of systems analysis and instructional development include the four basic elements (see Figure 5) of any instructional development system:

1. instructional objectives
2. pretest
3. instructional activities
4. posttest

DESIGNING AND DEVELOPING THE INSTRUCTIONAL UNIT

The actual development of the package was designed and carried out using the 4-D model of instructional development designed by Thiagarajan, Semmel, and Semmel.[161]

The 4-D model is composed of four stages of instructional development--define, design, develop, and disseminate (see Figure 6).

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[161] Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn T. Semmel, Instructional Development for Training Teachers of Exceptional Children: A Sourcebook (Bloomington, Indiana: Center for Innovation in Teaching the Handicapped, 1974), p. 5.

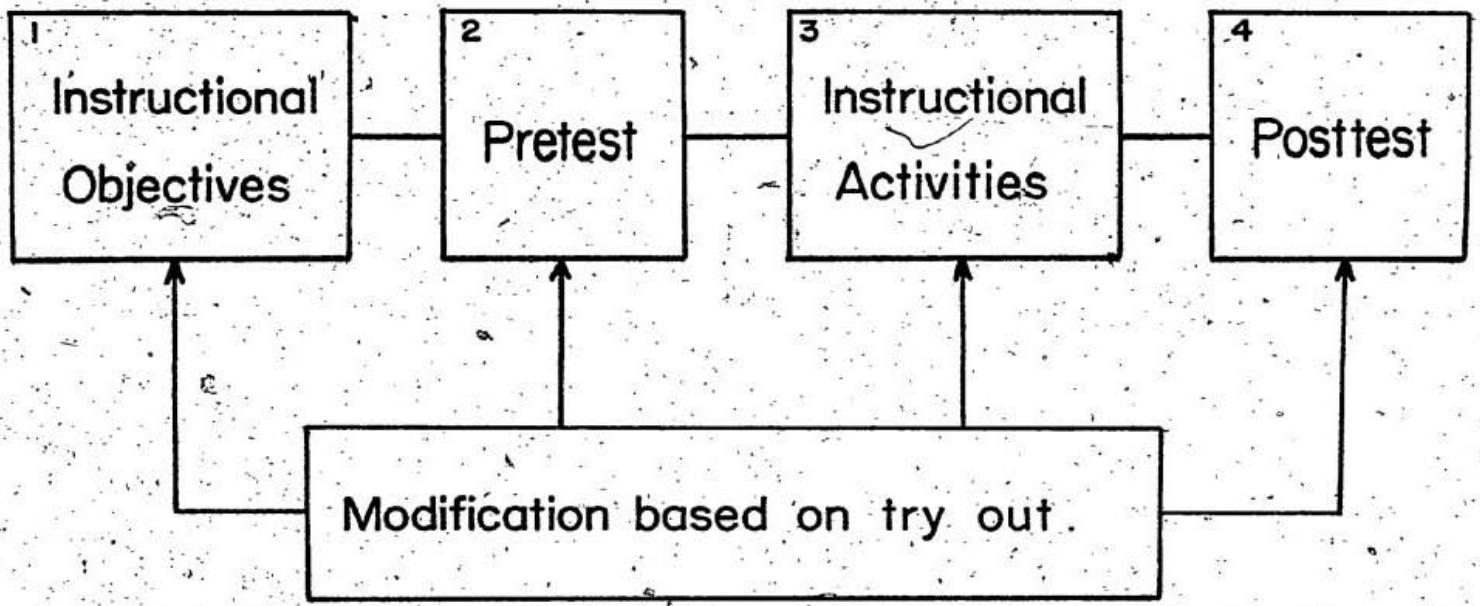

Figure 5. The Four Basic Elements of Instructional Development.

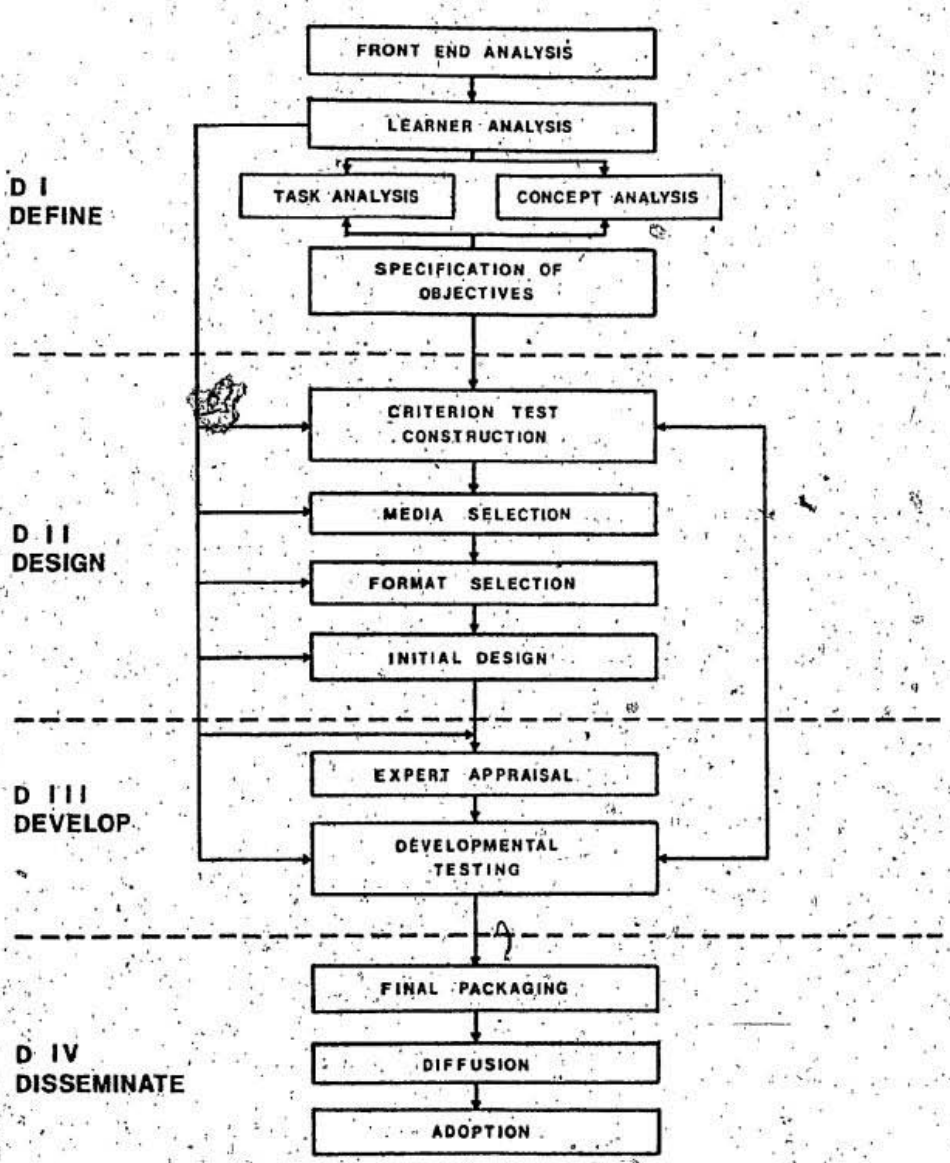

Figure 6. The 4-D Model of Instructional Development. In Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel, Instructional Development for Training Teachers of Exceptional Children: A Sourcebook (Bloomington, Indiana: Center for Innovation in Teaching the Handicapped, 1974), pp. 6-8.

For the purpose of this thesis project, the fourth stage was not a part of the task.

Identifying The Instructional Problem

It is an accepted supposition that learning tends to take place when certain conditions are satisfied. This is the basic principle of all educational achievement, and indeed of any kind of human effort. Few things are so character destroying as time and energy spent on tasks which are clearly purposeless. The classic example of keeping idle men occupied by digging holes and filling them in again is but one instance, possibly rather overplayed, of the frustration which arises from unrewarding effort. Although work in schools is rarely so demeaning as this, there are occasions in education when the purpose of a task is clear enough to the teacher, but quite obscure to the student population. This is not surprising considering the difference in their backgrounds and maturity. So often do students see their lessons as merely isolated academic entities which have little or no relation to what has already gone before and giving little indication of that which is to follow.

By the beginning of secondary school, the typically culturally disadvantaged student is reading at a level approximately three and a half years below grade level. He is considerably retarded in arithmetic and other school subjects. His problem solving and abstract thinking

are at a very low level as compared with others at this grade or age level. For these students there is a dissatisfaction with school such that they approach learning tasks in a most apathetic manner. There is much truth to this argument.

On the other hand, it is a known fact that when children become absorbed in a task that interests them they are prepared to concentrate far more intellectual effort upon it than they will summon up for a task which has no interest for them. For its successful completion they will often endure the drudgery of repetitive mechanical work which otherwise would bore them.

Background

A few years ago, the writer was given the responsibility of developing and teaching a make-shift social studies course intended for the low-achieving grade seven students at Beothuk Collegiate, Baie Verte, Newfoundland. The students were designated slow-learners as determined from their IQ range, a serious reading deficiency (usually two to three years behind grade level), and a record of low achievement or outright failure.

Because of the fact that these students came from environments differing from the cultural norm and partly because of a poor grounding in elementary school concepts and skills, the writer soon recognized that some of the simplest and basic skills in social studies, particularly in the area of map reading, were lacking in their cognitive

repertoire.

The greatest frustration, both for the teacher and student, occured in the area of interpreting latitude and longitude. Some students had not even heard the terms before while others understood and could use the skill fairly effectively.

It was because of the writer's frustration as a teacher and the students' bored and sometimes negative attitude, the seeming inability of most students to read even simple material, and the lack of appropriate materials, to teach the concepts of latitude and longitude to low-achieving Newfoundland junior high school students that the writer felt that the development of an individualized type of instructional module to teach some basic map reading skills was sorely needed in the schools.

Purpose

The broad instructional goal behind the construction of the instructional package was to help the student to develop desirable social competency in order to function successfully in a democratic society. More specifically, there were four general purposes for developing the instructional package:

1. to help the student acquire skill in using latitude and longitude;
2. to facilitate the use of maps in everyday life;
3. to facilitate instruction in geography and/or social studies;
4. to provide a more pictorial or symbolic form of presentation for the less verbal student.

Assessment of Student Needs

Before designing any type of program, there is a need to know, very precisely, for whom the materials are being designed. One must set out in detail everything that is known about the learners. Student characteristics will affect decisions concerning the selection of objectives, the level at which to start a topic, the depth of treatment, and the variety and extent of learning activities to be planned.

By noting what kinds of learner behavior are desired and then contrasting the learner's current behavior with what is desired, the gap between what is needed and what actually already exists can be identified. Generally speaking, this difference is referred to as an educational need. Baker and Popham explain that "an educational need represents some sort of deficiency which can be alleviated through education."[162] They conceive of an educational need in the following manner:

A desired learner outcome	-- (minus)	Learner's current status	== (equals)	An educational need

Educators are concerned with such needs because curricular goals can be established by identifying those deficiencies most in need of amelioration.

Baker and Popham have identified four steps to be considered

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[162] Eva L. Baker and W. James Popham, Expanding Dimensions of Instructional Objectives (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973), p. 28.

in detail in a systematic effort to decide on educational goals through the use of an educational needs assessment strategy:

1. Identify the sorts of behavior the teacher prefers learners to possess.
2. Decide what portion of learners the teacher really wants to master those most preferred behaviors identified in step one.
3. Find out what the learner's current status is through the use of criterion-referenced tests.
4. Select goals by contrasting desired status with current learner status.[163]

Based on the four steps outlined by Baker and Popham, it was shown, through test results, that a discrepancy existed in the learners in question between the criterion and their actual performance.

The causes of this discrepancy have already been indicated. It is the writer's contention that, among many, the main cause for the gap likely could be attributed to students' lack of development of concepts and skills in the elementary and primary grades and the low reading achievement of the students.

Providing For Student Needs. Based on the assessment of student needs, the teacher is faced with three possible alternatives:

1. to use the materials that are already available;
2. to use the materials which are already available, but

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[163] Eva L. Baker and W. James Popham, Expanding Dimensions of Instructional Objectives (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973), p. 42.

modify them to meet the needs of the students;

3. to develop something new.

A review of the grades seven and eight geography textbook series Introducing Earth by L. F. Hobley, which are the geography textbooks presently in use in Newfoundland schools, reveals that there is very little pertaining directly to map skill development.

Although the new metric edition of Introducing Earth contains a chapter on map skills, a check on the reading level of these textbooks, using Fry's Readability Graph (see Figure 7), revealed that both the grades seven and eight geography textbooks were at a grade eight reading level.

According to Estes and Vaughan the Fry's Readability Formula is "highly correlated with those obtained by using the Spache and Dale-Chall formulae."[164]

The directions for using the readability graph are as follows:

1. Select three one-hundred-word passages from near the beginning, middle, and end of the book. Skip all proper nouns.

2. Count the total number of sentences in each hundred-word passage (estimating to nearest tenth of a sentence). Average these three numbers.

3. Count the total number of syllables in each hundred-word sample. There is a syllable for each vowel sound; for example: cat (1), blackbird (2), continental (4). Don't be fooled by word size; for example: polio (3), through

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[164] Thomas H. Estes and Joseph L. Vaughan, Jr., Reading and Learning in the Content Classroom (Boston: Allyn and Bacon, Inc., 1978), p. 23.

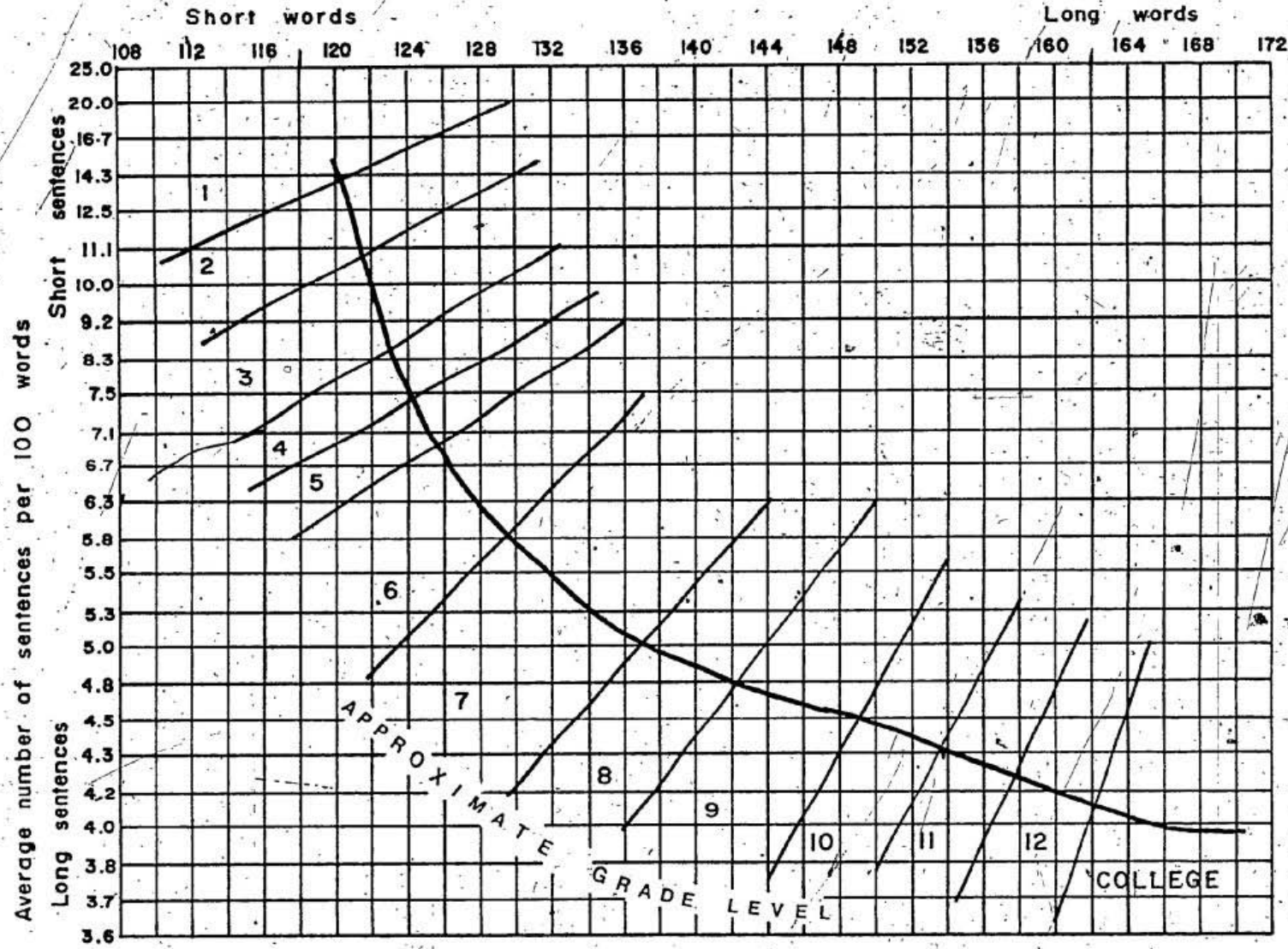

Figure 7. Graph for Estimating Readability. Edward Fry, "A Readability Formula that Saves Time," Journal of Reading, XI, 7 (April, 1968), p. 517.

(1). Endings such as -y, -ed, -el, or -le usually make a syllable, for example: ready (2), bottle (2). Average the total number of syllables for the three passages.

4. Plot on the graph the average number of sentences per hundred words and the average number of syllables per hundred words. Most plot points fall near the heavy curved line. Perpendicular lines mark off approximate grade level areas.[165]

Examples of how the readability formula was applied to the Introducing Earth series is provided below:

Grade Seven - Introducing Earth - Part I

	Sentences per 100 words	Syllables per 100 words
100 word sample, Page 2	4.9	143
100 word sample, Page 118	5.8	138
100 word sample, Page 227	3.8	135
	3)14.5	3) 416
	4.8	139

Grade Eight - Introducing Earth - Part II

	Sentences per 100 words	Syllables per 100 words
100 word sample, Page 7	4.4	136
100 word sample, Page 121	4.5	135
100 word sample, Page 230	6.1	155
	3)15.0	3) 426
	5.0	142

[165] Thomas H. Estes and Joseph L. Vaughan, Jr., Reading and Learning in the Content Classroom (Boston: Allyn and Bacon, Inc., 1978), pp. 23-24.

Plotting the findings on the readability graph, it was discovered that the reading level of both texts was at a grade eight level.

It was quite obvious from these findings that the low-achieving student who is reading at a level two to four years below his grade level will have difficulty in reading the Introducing Earth series.

There are many instructional materials that pertain to map skills, but they are all sadly lacking in an explanation of latitude and longitude and none really suits the instructional objectives. Some may be adapted for other map skills, but not for latitude and longitude. Below is a brief description of some of the more commonly used multi-media instructional kits on map reading skills:

1. "Exploring the World of Maps" (National Geographic Society). This series contains excellent filmstrips and synchronized tapes. Teachers guides are available, but there are no student booklets. The program is much too advanced to be useful.

2. "Map Skills for Beginners - Maps Show the Earth" (A. J. Nystrom and Company). The major objective of this program is to show children how natural and man-made features that appear on the surface of the earth are represented on a map. There is nothing specifically pertaining to latitude and longitude. It is designed for grades one to three. Use of this kit by low-achieving junior high school students would probably make them feel inferior.

3. "Working With Maps" (C. E. Carter, G. Thornley, and K.

Peace). This kit contains workcards, maps, photographs, still cards, and filmstrips. It is much too advanced for the low-achieving junior high student.

4. "SRA Map and Globe Skills" (Robert A. Naslund and Charles M. Brown). This is an excellent kit although there is too much emphasis on reading for the students under discussion.

A review of these multimedia kits and the present junior high school social studies textbooks and an assessment of the student needs suggested that the only solution seemed to be to develop new instructional materials aimed primarily at the needs of the individual student.

The new instructional materials had to fulfill certain standards if they were to be effective in meeting the needs of these students:

1. Simpilcity. It was very important that instructions and explanations be simple, legible, and easy to follow.

2. Reading level. Since the major concern was for a small group of students from the class who could not read very well, it was imperative that an audio-tape be used to accompany the other materials. The use of vocabulary on the tapes had to be kept simple.

3. Graphics. Any diagrams, maps, etc., had to be simple, attractive, and preferably in colour to make the material more appealing and easier to understand.

4. Evaluation. A pretest had to be provided to determine who needed the new materials and a posttest to judge the effectiveness of the kit and to decide whether the students were ready to move on

to other map skills.

Learner Analysis

Introduction. Under the traditional method of teaching social studies throughout the province of Newfoundland it was not necessary for the teacher to analyze the learners because they were all generally treated in the same way. However, with the increasing emphasis on individualized instruction, team teaching, programmed instruction, multimedia kits and other instructional techniques, learner analysis is becoming important. In fact, a report of the Social Studies Sequence Committee, Department of Instruction, St. John's, Newfoundland entitled The Role of the School in Newfoundland and Labrador: Some Implications states that "the needs of the learner is one factor which directly influences the nature of the school curriculum."[166] The report goes on to say that:

> ...in order to facilitate rather than hinder this development process, it is necessary for curriculum planners and teachers to understand the characteristics of the learner and how he learns at various stages. The curriculum, including social studies, should be planned bearing in mind the nature of the child and similarly classroom experiences must be designed in the light of his interests, abilities, modes of learning, and attitudes toward what is being taught.[167]

Laycock maintains that "the effectiveness of the entire pro-

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[166] Social Studies Sequence Committee, The Role of the School in Newfoundland and Labrador: Some Implications (St. John's, Newfoundland: Division of Instruction, Department of Education, 1978), p. 1.

[167] Ibid., p. 28.

cess of instructional planning hinges upon the accurate identification of learner characteristics."[168]

From the increased knowledge of how human beings grow and develop has come the realization of one very important truth: that teachers cannot effectively help young people develop skills, or any other learnings in the social studies, unless they consider the nature of the learner. It is now apparent that students bring with them to the classroom a wide range of personalities and patterns of behavior, as well as varying rates of growth and intelligence. All these factors, plus many others, will influence how and what a teacher has to teach.

Overview of Relevant Characteristics. A teacher must make a conscientious effort to identify the critical characteristics of students in order to design instructional materials appropriately. Here are some of the characteristics relevant to a detailed learner analysis and the accompanying assumptions pertinent to the sample tested:

1. Subject Matter Competence. The intended learner had a weak background in map skills. The entry behavior that was required of those who took the instructional package was shown to be weak. It was assumed, however, that these students had had some contact with maps and that they at least knew the four cardinal directions: north, south, east, west. It was further expected that they understood that

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[168] Virginia K. Laycock, "Assessing Learner Characteristics," Individualizing Educational Materials for Special Children in the Mainstream, eds. Robert M. Anderson, John G. Greer, and Sara J. Odle (Baltimore: University Park Press, 1978), p. 29.

north is at the top of a globe or map, unless otherwise indicated. These were about the only prerequisite skills needed in order to understand the instructional module.

2. Attitudes. It was assumed that most of the intended learners did not like the textbook-lecture approach. The investigator anticipated that they would respond positively to a self-instructional media package.

3. Language. The language level of the intended learners was very weak. It was important that the developer assume very little and use words, both in print and nonprint form, that would be in line with their cognitive development level. The developer's experience with learners similar to the sample indicated a preference on the part of these learners for conversational rather than academic language.

4. Tool Skills. The intended learners did not have any major handicapping conditions or sensory-perceptual problems that required special consideration. They were able to handle media equipment as long as they were provided with very simple and specific instructions. Most of these students had had very little contact with technological advancements. To set them in a learning resource center carrel with a television monitor and a videotape recorder or a rearview projection screen with all sorts of buttons, plugs, and dials would likely have caused more frustration than learning, to say nothing about attitudes towards social studies.

Task Analysis

A description of learning behaviors with respect to performance

level, specific skills, and learning style leads directly to the selection of individualized objectives, teaching strategies, and instructional materials.

However, before any of the above procedures are brought into play it is vitally important to do a task analysis. "It is," as Thiagarajan explains, "the means by which the instructional task is broken down into various component subtasks."[169] Thiagarajan goes on to say that:

> Task analysis forms the basis for both the construction of measuring instruments and the design of instructional materials. The type of instructional task, as determined by this analysis, helps to determine the media to be used.[170]

In developing a task analysis for the construction of an instructional tool for latitude and longitude the writer used the steps outlined by Thiagarajan as a model. These steps are:

1. Specify the main task.
2. Identify subtasks at the preceding level of complexity.
3. Treat each subtask as a main task and repeat the analytic procedure.
4. Terminate analysis when subtask reaches the entry level of the student.

Figure 8 illustrates how the completed task analysis looks.

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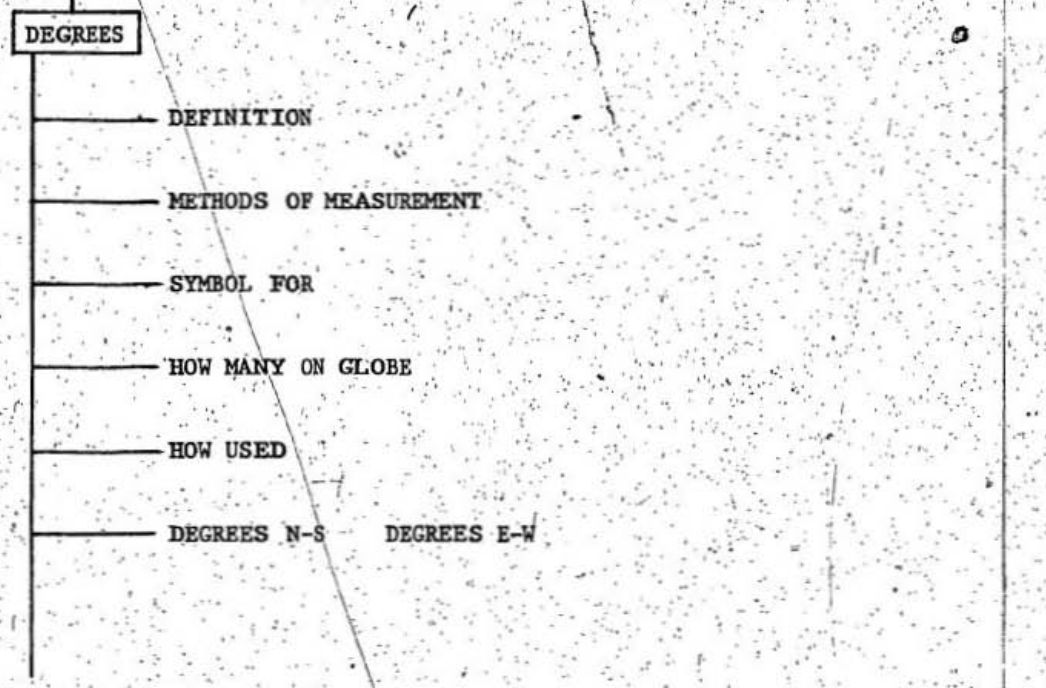
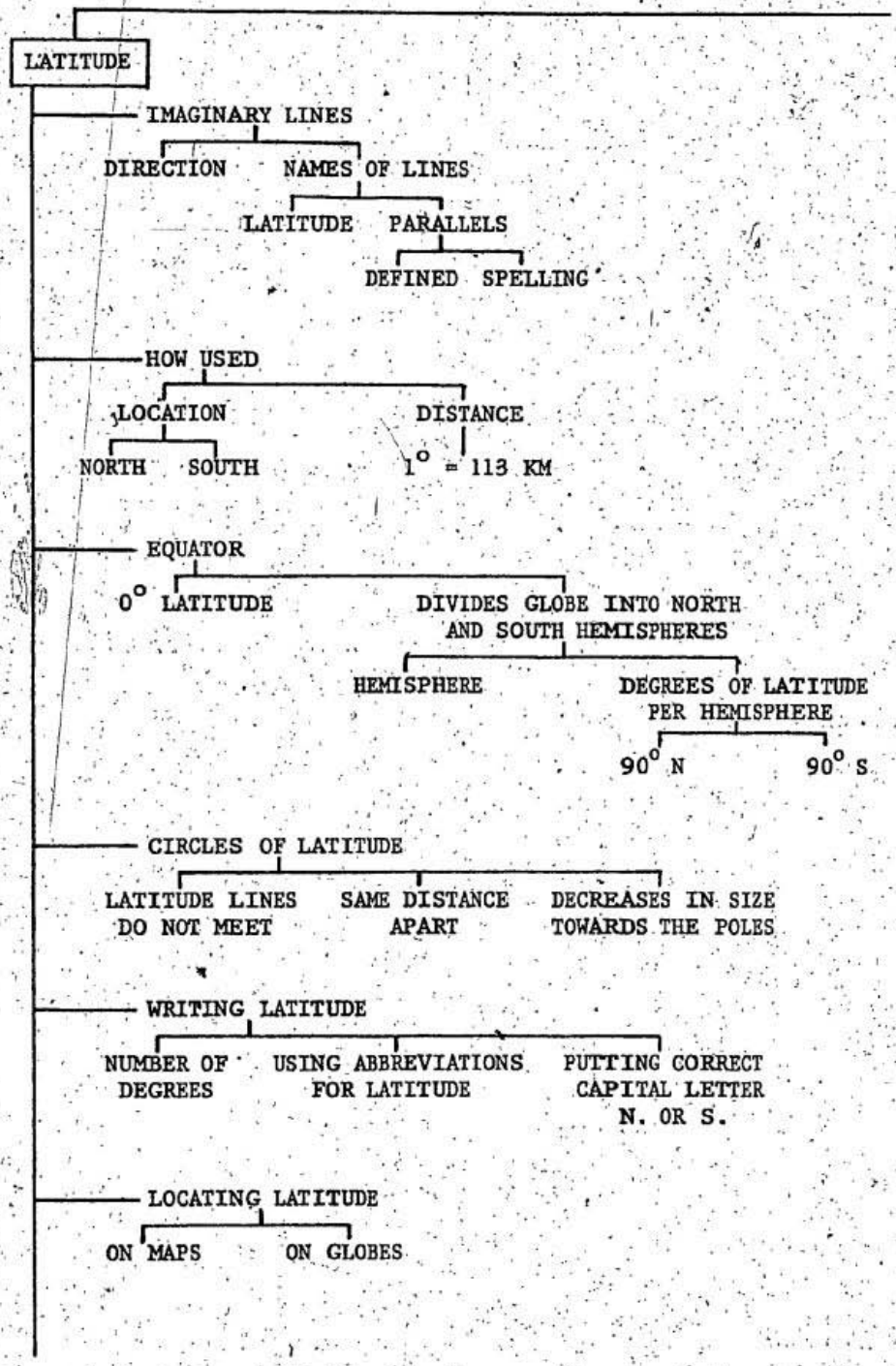
[169] Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel, Instructional Development for Training Teachers of Exceptional Children: A Sourcebook (Bloomington, Indiana: Center for Innovations in Teaching the Handicapped, 1974), p. 31.

[170] Ibid.


DEGREES
DEFINITION
METHODS OF MEASUREMENT
SYMBOL FOR
HOW MANY ON GLOBE
HOW USED
DEGREES N-S
DEGREES E-W

1 of

LATITUDE


LATITUDE
IMAGINARY LINES
DIRECTION
NAMES OF LINES
LATITUDE
PARALLELS
DEFINED
SPELLING
HOW USED
LOCATION
DISTANCE
NORTH
SOUTH
1° = 113 KM
EQUATOR
0° LATITUDE
DIVIDES GLOBE INTO NORTH AND SOUTH HEMISPHERES
HEMISPHERE
DEGREES OF LATITUDE PER HEMISPHERE
90° N
90° S
CIRCLES OF LATITUDE
LATITUDE LINES DO NOT MEET
SAME DISTANCE APART
DECREASES IN SIZE TOWARDS THE POLES
WRITING LATITUDE
NUMBER OF DEGREES
USING ABBREVIATIONS FOR LATITUDE
PUTTING CORRECT CAPITAL LETTER N. OR S.
LOCATING LATITUDE
ON MAPS
ON GLOBES

LONGITUDE

- LONGITUDE
  - IMAGINARY LINES
    - DIRECTION
    - NAMES OF LINES
      - LONGITUDE
      - MERIDIANS
        - DEFINED
        - SPELLING
  - HOW USED
    - LOCATION
    - DISTANCE
      - NORTH
      - SOUTH
  - PRIME MERIDIAN
    - 0° LONGITUDE
    - GREENWICH ENGLAND
      - AGREED AMONG NATIONS OF WORLD
      - 0° LONG. PASSES THROUGH
    - DIVIDES GLOBE INTO E. & W. HEMISPHERES
      - DEGREES LONG. PER HEMISPHERE
        - 180° E
        - 180° W
  - CIRCLES OF LONGITUDE
    - INTERSECT AT POLES
  - WRITING LONGITUDE
    - NUMBER OF DEGREES
    - USING ABBREVIATIONS FOR LONGITUDE
    - PUTTING CORRECT CAPITAL LETTER E. OR W.
  - LOCATING LONGITUDE
    - ON MAPS
    - ON GLOBES

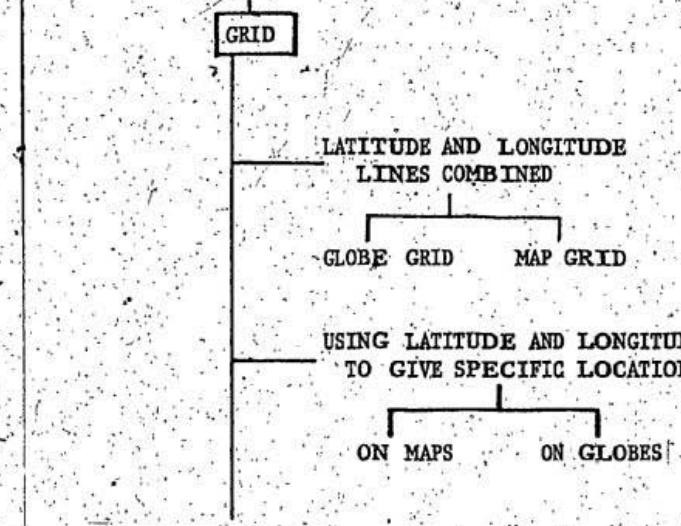


Figure 8. Task Analysis for Latitude and Longitude. After Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel, Instructional Development for Training Teachers of Exceptional Children: A Sourcebook (Bloomington, Indiana: Center for Innovations in Teaching the Handicapped, 1974).

Tasks and Subtasks. The main task for the subjects was to understand latitude and longitude. The writer felt that to teach these concepts to low-achieving junior high school students required four major subtasks: the understanding of the factors of degree, latitude, longitude, and grid.

1. Degree. Latitude and longitude lines are based on the use of degrees and so it was necessary for students to know what a degree is, how degrees are used for measurement on a map, the symbol for degree, and how many degrees are on a globe. From this understanding students would know how degrees are used to make north-south and east-west measurements.

2. Latitude. Students had to be informed from the beginning that latitudes are imaginary lines that go around the world from east to west. They also had to know that these lines are called latitude lines or parallels. The word parallel was new so it had to be defined clearly. Because it is an important term, students were expected to learn how to spell it.

The next step was to explain how latitude (parallels) lines are used for location and distance. It had to be emphasized that latitude lines are for north-south locations only. It also had to be pointed out, although not emphasized as much as location at this level, that latitude lines can be used to measure distance since one degree of latitude equals approximately one hundred thirteen kilometers.

a. Equator. To understand the terms north latitude and south latitude, students first had to understand the term equator. They had to know that the equator is the zero degree latitude line that divides the globe into the northern and southern hemispheres.

b. Hemispheres. At this point hemispheres had to be explained before students could be expected to understand that each hemisphere has ninety degrees latitude.

Before students could actually write and locate latitude, it was also important for them to understand that latitude lines are lines that go around a globe, that they are the same distance apart, and that they decrease in size going towards the north and south poles.

Students also needed to understand that there is a method to writing down the location of a place according to its latitude. First, there is the abbreviation lat. for latitude, followed by the number of degrees, and finally a capital letter N. or S. for north or south, depending on the direction.

With this information the student was ready to see how latitude lines are actually used on a map or globe for locating various places and features.

3. Longitude. The procedure was practically the same as that mentioned for latitude, but a step-by-step process had to be explained because longitude is the exact opposite of latitude and to slow-learning students to say that longitude is just the opposite of latitude was not enough. They had to be made aware that longitude lines are imaginary lines that run from north to south and that they are sometimes called meridians. Their use for location and distance are the same as that for latitude except that measurements are east-west instead of north-south.

a. Prime Meridian. Latitude has its beginning line called the equator. Longitude also has a beginning line called the prime meridian. Students had to understand that the prime meridian is the zero

degree longitude line and that it passes through Greenwich, England, thus helping divide the globe into two hemispheres, east and west.

Since Greenwich, England, meant little to those students, it was necessary to explain that the zero degree longitude line passes through Greenwich because of a general agreement among the nations of the world. No further elaboration was given since it was not really the purpose of the unit.

As with latitude, the student was led to understand that there are a certain number of longitude degrees per hemisphere. Because longitude lines are different from latitude, there are one hundred eighty degrees longitude in each of the eastern and western hemispheres as opposed to ninety degrees latitude in the northern and southern hemispheres.

The next step was to explain that longitude lines are circles that intersect at the poles. They are not parallel.

Although somewhat redundant, it was important to point out the proper method for expressing longitude. The method is exactly the same as that used for latitude. First is the abbreviation for longitude, then the number of degrees, and finally E. or W. depending on direction.

At that point the student was ready to combine what he had learned. Before he did that, the concept of grid was explained. It was made clear that the term grid means a combination of latitude and longitude lines on a globe, in which case it is called a globe grid, or in the case of a map, a map grid.

The final step was to illustrate how latitude and longitude to-

gether can be used to give the exact location of a place or feature.

At the end of the unit, it was expected that students would be able to use the terms latitude, east-west line, and parallel interchangeably and use the terms longitude, north-south line, and meridian interchangeably. This researcher also anticipated that these pupils would be able to use latitude and longitude lines for finding location on any map or globe.

Behavorial Objectives. One of the most important steps in the instructional development process is the formation of learning objectives. Mager stresses that "when clearly defined goals are lacking, it is impossible to evaluate a course or program efficiently, and there is no sound basis for selecting appropriate materials, content or instructional methods."[171]

Thiagarajan explains that the "specification of objectives is the transformation of task and concept analysis into statements of goals for instructional materials."[172] He also points out that "the nature of the objectives is also one of the most important factors in the selection of instructional media and format."[173]

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[171]Robert F. Mager, Preparing Instructional Objectives, 2nd ed. (Belmont, California: Fearon Publishers, 1975), p. 3.

[172]Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel, Instructional Development for Training Teachers of Exceptional Children: A Sourcebook (Bloomington, Indiana: Center for Innovations in Teaching the Handicapped, 1974), p. 49.

[173]Ibid.

Tyler,[174] and Gagne[175] explain that such objectives are important as a guide to the instructional designer, to establish the teacher's role in instruction, and to establish the student's role in learning, and in defining reinforcing situations for the learner.

Lehmann states that the formation of behavorial objectives "is the most important step of the systems approach, because all subsequent steps are designed to cause the learning system to meet these objectives."[176]

A set of objectives, then, becomes the most critical component of the instructional package. Care must be taken in constructing these learning objectives. In order to be effective, they should be stated in behavorial terms. Much has been written on the specification of objectives in behavorial terms. Efforts by Tyler,[177] Bloom,[178] Mager,[179]

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[174]R. W. Tyler, "Some Persistent Questions on the Defining of Objectives," Defining Educational Objectives, ed. C. M. Lindvall (Pittsburgh, Penn.: University of Pittsburgh Press, 1964).

[175]Robert M. Gagne, The Conditions of Learning (New York: Holt, Rinehart & Winston, Inc., 1965).

[176]Henry Lehmann, "The Systems Approach to Education: Project ARISTOTLE," Audiovisual Instruction, XIII, 2 (February, 1968), 145.

[177]R. W. Tyler, Constructing Achievement Tests (Columbus, Ohio: Ohio State University, 1934).

[178]B. S. Bloom, et al., Taxonomy of Educational Objectives - The Classification of Educational Goals, Handbook I: Cognitive Domain (New York: David McKay Co., Inc., 1956).

[179]Robert F. Mager, Preparing Instructional Objectives, 2nd ed. (Belmont, California: Fearon Publishers, 1975).

Krathwohl,[180] Gagne,[181] Glaser,[182] and Popham[183] have been influential in this area.

Kemp suggests that there are four types of objectives relating to behavior: fact learning, concept formation, principle learning, and problem solving.[184] Because of the nature of the learners for whom the unit on Map Reading Skills - Latitude and Longitude was designed, most of the behavorial objectives stated in this project are aimed at the "fact learning" and "concept formation" aspect of Kemp's classification.

Describing what the student will be able to do is not enough. Mager explains that "we can increase the communication power of an objective by telling them how well we want them to be able to do it."[185]

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[180] D. R. Krathwohl, B. S. Bloom, and B. B. Masia, Taxonomy of Educational Objectives - The Classification of Educational Goals, Handbook II: Affective Domain (New York: David McKay Co., Inc., 1964).

[181] Robert M. Gagne, "Educational Objectives and Human Performance," Learning and the Educational Process, ed. J. D. Krumboltz (Chicago: Rand McNally Co., 1965).

[182] Robert Glaser, (ed.) Training Research and Education (Pittsburgh, Penn.: University of Pittsburgh Press, 1962).

[183] W. J. Popham, (ed.) Instructional Objectives (Chicago: Rand McNally Co., 1969).

[184] Jerrold E. Kemp, Instructional Design: A Plan for Unit and Course Development (Belmont, California: Lear Siegler, Inc., 1971).

[185] Robert F. Mager, Preparing Instructional Objectives, 2nd ed. (Belmont, California: Fearon Publishers, Inc., 1975), p. 71.

In other words, a statement of objectives in behavorial terms acts as a standard by which performance is evaluated, that is as a means for determining whether instruction is successful in achieving the instructional intent.

Based on the analysis of the learner and the task analysis, it was hoped that the student, upon completion of the unit on latitude and longitude, would be able to use latitude and longitude with a high degree of efficiency to locate places on a map or globe. Specifically, at the end of the unit the student would be able to perform these functions.

1. Write the word degree in response to a definition asking for the word degree.

2. Write the word latitude in reply to a definition asking for the word latitude.

3. Write, without the aid of references, the word parallel, with one hundred percent accuracy.

4. Locate places marked on a map and express their locations in terms of latitude.

5. State the number of kilometers that one degree of latitude equals.

6. Distinguish between eastern and western hemispheres on a simple pictorial representation of a globe.

7. State the exact number of degrees of latitude at the north and south poles.

8. Label which one of two diagrams shows the correct spacing of latitude lines.

9. Identify, among three others, the correct method to be used to write the latitude of a particular place.

10. Write the word longitude in reply to a definition asking for the word longitude.

11. Name, with one hundred percent accuracy, the other term for longitude.

12. Describe the location of a point on a simple pictorial representation of a globe in terms of its degrees of longitude.

13. Describe the location of a point on a simple pictorial representation of a globe in terms of its east or west longitude.

14. Know that the prime meridian is the 0^{o} starting line for measuring longitude.

15. Name the place, with one hundred percent accuracy, through which the prime meridian passes and from which it gets its name.

16. State, with one hundred percent accuracy, the exact number of degrees of longitude in the eastern or western hemispheres.

17. Write the correct method to be used to express the longitude co-ordinate of a point shown on a pictorial representation of a globe or a simple map.

18. Write, given a simple map or pictorial representation of a globe with longitude lines, the longitude co-ordinates of two places.

19. Name the term used to describe a combination of latitude and longitude lines on a map or globe.

20. Recall and label, given a simple grid map, which are

latitude lines and which are longitude lines.

21. Write the co-ordinates for dots placed on a world map containing latitude and longitude lines.

22. Choose the correct method to be used to express the latitude and longitude of a place from among three other choices.

23. Choose from among three other choices the letter which expresses the correct location of a point on a simple grid map when tha latitude and longitude co-ordinates for that point are provided.

24. Decide which one of four diagrams is the correct way to represent longitude lines as viewed from the north pole.

25. Decide which one of three diagrams is the correct way to represent latitude and longitude lines on a globe.

Rationale For Choice of Media

Background. Walsh points out that "one of the most important influences on instructional design in the past two decades has been the influx of educational technology of all kinds into the learning situation."[186]

Gillett,[187] Kinder[188] and many others emphasize the role of

[186] John W. Walsh, "A Report on the Preparation of A Teaching Unit on Motion: An Integrated Approach to Instructional Development," (unpublished Master's thesis, Memorial University, St. John's, Newfoundland, 1977), p. 57.

[187] Margaret Gillett, Educational Technology: Towards Demystification (Scarborough, Ontario: Prentice-Hall of Canada, 1973), p. 2.

[188] J. S. Kinder, Using Instructional Media (Toronto: D. Van Nostrand Co., 1973).

educational technology in aiding individual and small and large group instruction. They stress the need for the integration of educational media into the instructional scheme rather than its use as a mere adjunct to instruction.

Based on the selective review of research studies showing media effectiveness over the past twenty years, Moldstad makes the following claims about instructional technology:

> 1. Significantly greater learning often results when media are integrated into the traditional instructional program.
> 2. Equal amounts of learning are often accomplished in significantly less time using instructional technology.
> 3. Multimedia instructional programs based upon a 'systems approach' frequently facilitate student learning more effectively than traditional instruction.
> 4. Multimedia and/or audiotutorial instructional programs are usually preferred by students when compared with traditional instruction.[189]

Any realistic discussion of instructional resources must be tied closely to a consideration of the goals to be achieved and the methods used to achieve these goals. Michaelis emphasizes this point in suggesting that the selection of instructional materials be appropriate to the maturity of the children who are going to use them.[190]

Dale says that audiovisual materials can be especially helpful

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[189] John A. Moldstad, "Selective Review of Research Studies Showing Media Effectiveness: A Primer for Media Directors," AV Communications Review, XXII, 4 (Winter, 1974), 390.

[190] John U. Michaelis, Social Studies for Children in A Democracy: Recent Trends and Developments, 6th ed. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1976), p. 339.

for meeting the needs of learners at varying levels of abilities.[191]

Though they provide no cure-all, the evidence is clear that audio-visual materials can make meaningful contributions to the learning experiences of both fast and slow learners. "The direct, precise qualities of a film, or recording, or a scale model," as Dale explains, "convey significant information to certain pupils who may be less proficient than others in reading skills."[192]

The printed word is one of the most abstract forms of communication. It is as far from the real thing as possible. This is not to say that the printed word is not valuable, but sometimes the nature of the learner makes it necessary to bring him closer to reality. For the low-achieving student, especially experiences with the real thing, or with representational media, are necessary for adequate skill formation.

Attitudes Toward Media. Although much of the research indicates a positive attitude towards the use of nonprint media in the instructional learning process, a moment might be spent looking at the degree to which mediated resource packages are accepted and used in the social studies programs in Newfoundland schools.

Tilley conducted a survey to determine the attitudes of social studies teachers in Newfoundland toward the use of nonprint materials as teaching aids in the classroom. A semantic differential question-

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[191]Edgar Dale, Audiovisual Methods in Teaching, 3rd ed. (New York: Holt, Rinehart & Winston, Inc., 1969), p. 50.

[200]Ibid.

naire was sent to fifty-two schools, chosen at random, throughout Newfoundland. Three elements were contained in the instrument: a concept the experimenter wished to evaluate, twenty sets of bipolar adjectives describing how the subject felt about the concept, and a seven point ranking system to show the intensity of the subject's feelings toward a specific content. The results of the questionnaire showed that the attitude of social studies teachers in Newfoundland is positively oriented toward the use of nonprint material in the classroom.[193]

Selection of Media. The problem is not just one of selecting appropriate materials, but also one of selecting the type of media which will most effectively meet the needs of the student, keeping in mind the nature of the topic and the objectives of the program.

Briggs stresses the importance of relating media selection to learning conditions when he says:

> While one cannot directly relate classes of media with conditions of learning in such a way as to make media choices simple by comparing two tables, it is believed that the examination of the required conditions of learning for each educational objective, along with other specifiable kinds of information, can result in an improved basis for assigning the media to be used for a set of objectives.[194]

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[193]Ross Tilley, "A Report on the Development of An Instructional Unit Entitled 'Shipbuilding at the Marystown Shipyard'," (unpublished Master's thesis, Memorial University, St. John's, Newfoundland, 1977), pp. 36-37.

[194]Leslie J. Briggs, et al., Instructional Media (Pittsburgh, Pennsylvania: American Institutes for Research, 1967), p. 3.

The main criterion for selecting media, then, is whether it will help the learner practice what is needed to accomplish the objectives. In this way, the learner is assured of performing well on the criterion test and the teacher is assured of being successful.

Dick and Carey have suggested a number of factors to be considered in selecting media for instruction. They are:

1. type of learning involved in the objectives;
2. availability of various media in the environment in which the instructional package will be used;
3. ability of the designer to produce material in a particular media format;
4. flexibility, durability, and convenience;
5. cost effectiveness.[195]

In designing the instructional package on latitude and longitude, the writer referred to the factors outlined by Dick and Carey. To aid in the actual selection of the media format the procedures developed by Carpenter were used (see Figures 9 and 10).

Based on the characteristics of the students for whom the instructional package was designed, selection of media fell within calss two of the "simplest appropriate media class for concrete subjects" (see Figure 9). It was assumed that the learners would require simultaneous visual and audial stimulation as well as concrete experiences in order for learning to be effective. Due to the nature

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[195] Walter Dick and Lou Carey, The Systematic Design of Instruction (Glenview, Illinois: Scott, Foresman and Co., 1978), pp. 128-129.

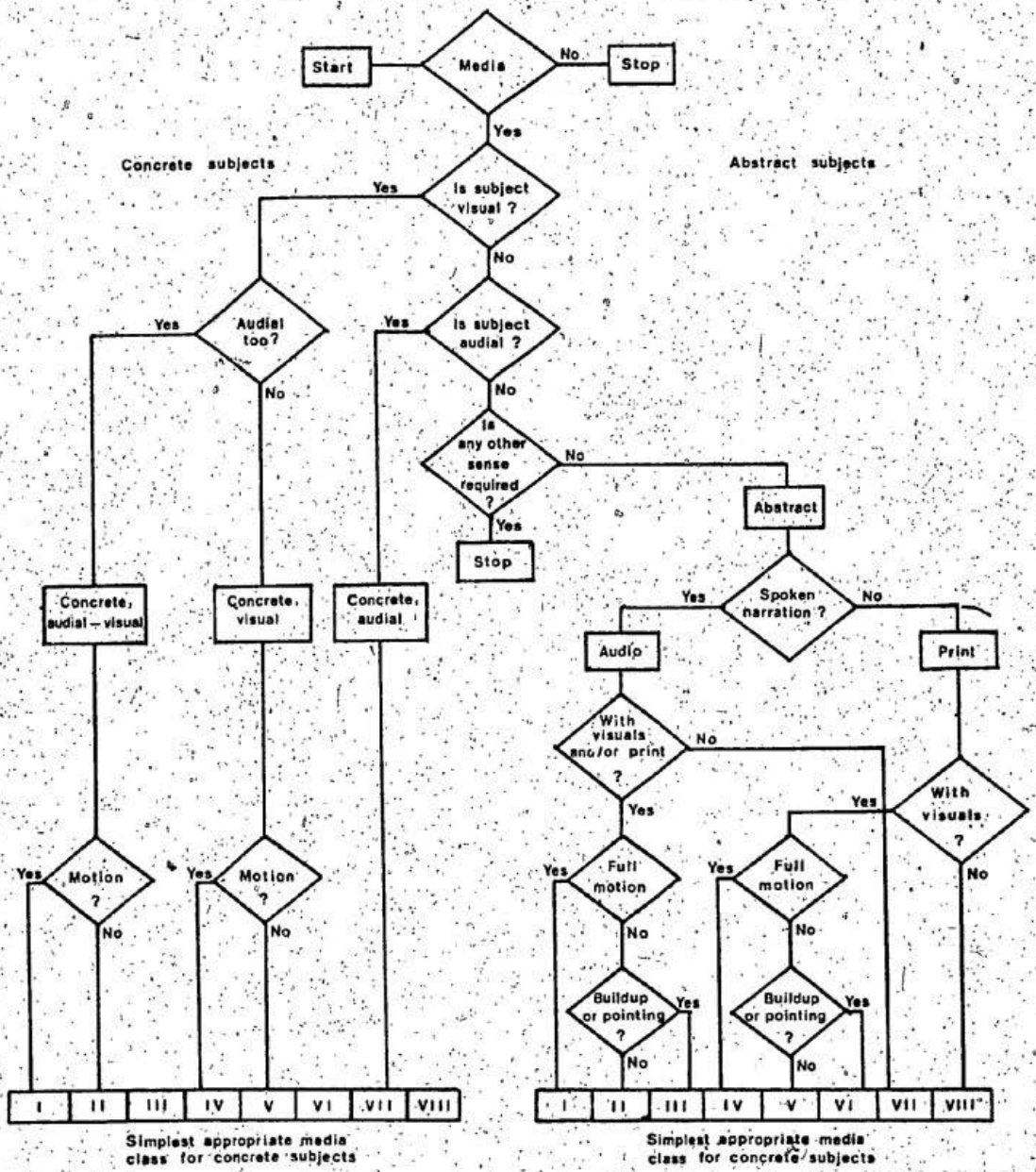

Figure 9. Selection of the Simplest Media Class for A Lesson Segment. Polly Carpenter, A New Kit of Tools for Designing Instructional Systems (Santa Monica, California: Rand McNally, 1970), p. 11. (ERIC ED 046 214).

TELECOMMUNICATION	Sound	Picture	Line Graph	Print	Motion	RECORDING
CLASS I: AUDIO - MOTION - VISUAL						
	X	X	X	X	X	Sound film •
Television •	X	X	X	X	X	Video tape • / Film TV recording •
	X	X	X	X	X	Holographic recording
Picturephone	X	X	X	X	X	
CLASS II: AUDIO - STILL - VISUAL						
Slow-scan TV • / Time-shared TV •	X	X	X	X		Recorded still TV •
	X	X	X	X		Sound filmstrip •
	X	X	X	X		Sound slide-set •
	X	X	X	X		Sound-on-slide •
	X	X	X	X		Sound page •
	X	X	X	X		Taking book •
CLASS III: AUDIO - SEMIMOTION						
Telewriting •	X		X	X	X	Recorded telewriting •
Audio pointer •	X		X	X	X	
CLASS IV: MOTION - VISUAL						
		X	X	X	X	Silent film •
CLASS V: STILL - VISUAL						
Facsimile		X	X	X		Printed page •
		X	X	X		Filmstrip •
		X	X	X		Picture set •
		X	X	X		Microfilm
		X	X	X		Videofilm
CLASS VI: SEMIMOTION						
Telautograph			X	X	X	
CLASS VII: AUDIO						
Telephone • / Radio •	X					Audio disc • / Audio tape •
CLASS VIII: PRINT						
Teletype •				X		Punched paper tape

•Media currently used in instruction

Figure 10. The Communications Media. Polly Carpenter, A New Kit of Tools for Designing Instructional Systems (Santa Monica, California: Rand McNally, 1970), p. 11. (ERIC ED 046 214).

of the subject matter, however, motion was not necessary.

According to Figure 10, class two includes sound filmstrips, sound slide-sets, sound-on-slide, sound page or talking book using sound, picture, line graphics and print. The research studies on sound and/or slides and filmstrips quoted in chapter two of this report confirm that these audiovisual techniques do have a significant effect on learning. A great deal of statistical evidence is also accumulating to show that instructional media can increase the efficiency and effectiveness of instruction.

Considering the learner characteristics, nature of the topic, and a review of relevant research, materials for the instructional package on latitude and longitude consist of an audiovisual presentation with individual student booklets. The audiovisual presentation takes the form of a slide-tape production. There were several reasons for choosing this particular medium.

1. It could be produced with relatively simple equipment.

2. It could be easily altered during the various stages of development.

3. It could eventually be developed into a filmstrip/tape production allowing it to be used in any school with the available equipment.

The whole multimedia kit is self-contained and therefore it can be easily stored offering future students the opportunity to use it repeatedly over the years. It is individualized in that a student

is able to take the lesson at his own convenience and proceed at his own pace. Budget-minded administrators will find that it costs very little to develop the kit. The time required and production facilities needed to develop the kit are minimal. Even the smallest educational institution today can afford the equipment to produce the necessary kit materials.

Because of its portability, the package does not require a special learning center with independent study carrels. It can be used in any area of the school that might be free.

Development Procedures and Formative Evaluation

Initial Production. After deciding on the slide-tape format as the chief mode of presentation, the next step was the production of these materials. Most of the materials, i.e., slides and tapes (see Appendix A), with accompanying audio script (Appendix B), student booklet (Appendix C), and teacher's manual (Appendix D) were produced by the writer. Most of the slides were processed commercially and the audio tapes were edited using equipment available in the Green Bay Integrated School District.

Once developed, the total instructional package, including pre-test and posttest (see Appendix E), was evaluated by a content specialist from the Geography Department of Memorial University; two teachers of geography in the schools under the Green Bay Integrated School District;

and a social studies department head at Beothuk Collegiate, Baie Verte, Newfoundland. The instructional development procedures and the quality of slides, tapes, and graphics were also evaluated by a professor in the Division of Learning Resources of the Faculty of Education of Memorial University. Finally, before administering the package to the intended target group, six students were chosen who were not members of the target group, but who were at the same ability level, to try out the package. Figure 11 illustrates how the instructional package was systematically evaluated.

The net effect of such an evaluation system, when built into the instructional development system, was to provide relevant data for continuing revision and improvement before the instructional package was administered to the intended target group.

Walsh makes a very relevant point that should be kept in mind when evaluating instructional packages:

> The danger here, however, is to become so bogged down in obtaining data that little improvement takes place. Evaluation is probably the most researched topic in all of education, with models and systems of various types abounding in the literature. The developer-teacher must be careful to regain control of the evaluation system and not let it become the main function of the program. Too much data can overwhelm, rather than assist, in program development if it is allowed to.[196]

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[196] John W. Walsh, "A Report on the Preparation of A Teaching Unit on Motion: An Integrated Approach to Instructional Development" (unpublished Master's thesis, Memorial University, St. John's, Newfoundland, 1977), pp. 51-52.

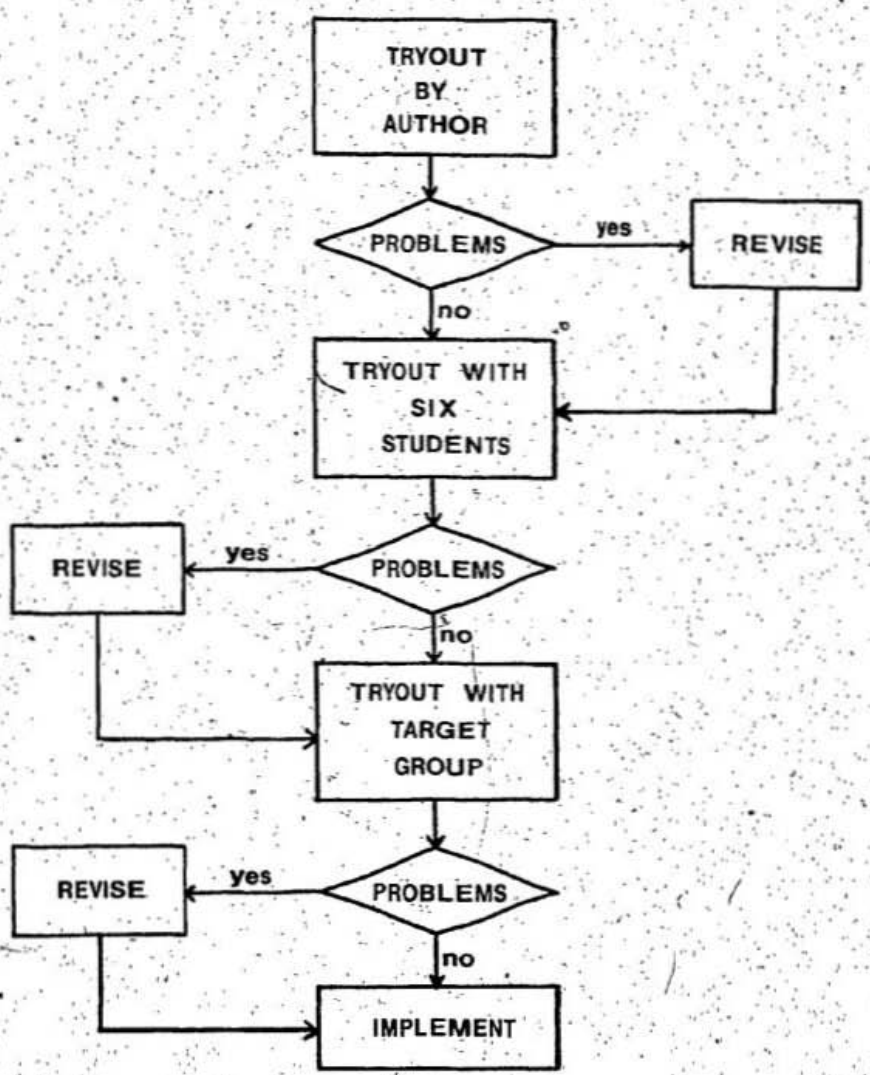

Figure 11. A Flow Chart for A Systematic Evaluation of Instructional Packages.

SUMMARY

Because the range of abilities within a class of students is sometimes varied, the lecture method of instruction may not be appropriate. The vast range of individual differences makes it imperative that instructional planning be for the individual rather than for the class as a whole.

Systematically designed instruction can greatly affect individual development. As a consequence the development of instructional materials must consider the nature of learning and how it relates to a theory of instruction. A great deal has been written about theories of instruction and instructional development as a procedure for designing, specifying, or producing particular situations based on human cognitive growth to modify individual behavior through learning.

Learning entails a communication among the components of a system, i.e., program of instruction, instructor, and students, and therefore lends itself to the systems approach to instructional development. Based on this approach, there are several stages in developing an instructional unit. First there is the needs assessment of the students and an analysis of the learner characteristics. This is followed by a statement of the objectives, both specific and general, in behavorial terms. The selection of a media format is next. Research studies indicate that most pupils hold a positive attitude toward the use of nonprint materials as teaching aids for social studies.

Once developed, the instructional package undergoes an intensive

formative evaluation involving the use of content and procedural specialists, classroom teachers, and a small sample of students. Based on the results of the formative evaluation, revisions are made to the instructional package before it is subjected to a summative type of evaluation.

Chapter 4

INVESTIGATIVE METHODOLOGY

PREVIEW

The previous chapter outlined and described the steps in the instructional design process, emphasizing the formative evaluation of materials. However, formative evaluation is not sufficient in and of itself. A decision has to be made as to whether the instructional materials are effective. In order to reach that decision a summative evaluation was conducted. Summative evaluation, as Dick and Carey explain, may be defined as "the design, collection, and interpretation of data and information for a given set of instructional materials for the purpose of determining the value or worth of these materials."[197]

This chapter presents the hypotheses to be tested in the study. Also, limitations of the study are outlined. A brief description of the geographic location and study area as a limiting factor is included. The chapter also explains (a) how the experimental design for the study was chosen in the light of the nature of the sample, (b) the sample selection, and (c) the variables manipulated.

Following a description of the analysis of the variables, the explanation of the summative evaluation continues with an explanation of the nature of the pretest and posttest, how they were constructed,

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[197]Walter Dick and Lou Carey, The Systematic Design of Instruction (Glenview, Illinois: Scott, Foresman and Co., 1978), p. 202.

validated, and applied. Finally, statistical methods which were employed to analyze the results from the study are outlined.

RESTATEMENT OF THE PROBLEM

The purpose of this project was to develop and test an instructional package designed to teach the basic map-reading skills of latitude and longitude to slow-learning students entering junior high school. According to the design of the present Newfoundland geography curriculum, these students should have been taught the skills prior to junior high school. However, from the perspective of this researcher many slow-learning students from rural outport areas of the province have not mastered these prerequisite skills. It is the writer's contention that the development of an individualized instructional kit could help these students develop the necessary prerequisite skills before continuing the geography program as outlined for grades seven and eight.

MAJOR HYPOTHESIS

Although the major purpose of the instructional unit was to help the few slow-learning students who had been segregated into a group because of their low achievement and who lacked the basic geographic concepts of latitude and longitude, the researcher wanted to know whether the instructional kit was really an effective teaching-learning tool as well. For this reason, a study was conducted to test the following null hypothesis:

H_0: There is no significant difference between a control group which is taught by the conventional textbook-lecture method of instruction and an experimental group which recieves the instructional package.

Sub-Hypotheses

H_{0_1}: There is no significant difference between the results of the control group posttest and the results of the experimental group posttest.

H_{0_2}: The difference between results on the pretest and posttest for the experimental group is not significantly different from those of the control group.

LIMITATIONS OF THE STUDY

Because the instructional package was developed to meet a local need recognized by the developer, the study was geographically limited to the community of Baie Verte, Newfoundland (see Figure 12), and one school in that community, namely Beothuk Collegiate.

Other limitations of the study included these factors:

1. Since the study was limited to field testing in one school, applicability of the materials to other schools with different facilities cannot be judged.

2. The study was limited to the development of an instructional package to teach two concepts only.

3. Sample size was limited to a selection of students from one homogeneously grouped class. A larger sample would no doubt have added

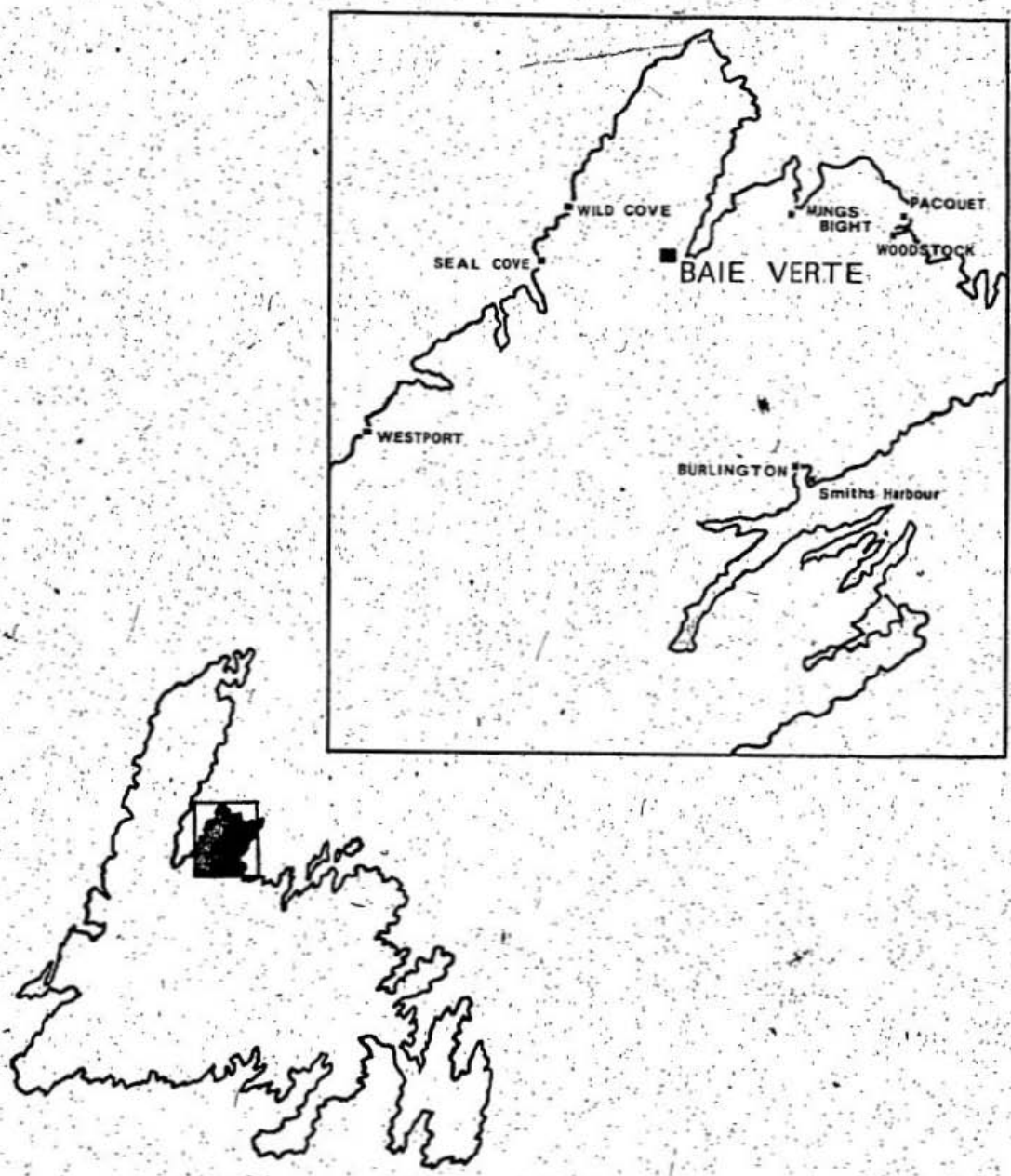

Figure 12. Location of Baie Verte and Surrounding Feeder Communities.

strength with respect to internal validity.

4. No attempt was made to test the applicability of the procedures to other students of higher ability.

5. The study was not intended to evaluate the use of instructional packages in general.

6. Any conclusions drawn were restricted to the materials specifically developed for the study.

SELECTION OF SAMPLE

It is extremely difficult to set up experimental studies in a manner which satisfactorily meets all the conditions of a scientifically controlled study. Often compromises must be made in terms of random assignment of students to various instructional activities. This is particularly so for the study in question. The sample for this study consisted of one low-achieving grade seven class (twenty students) from Beothuk Collegiate. Within the class, however, students were divided equally into a control and experimental group. Students' names were listed in order as they occurred in the class register and numbered. The students were randomly assigned to two groups by using a table of four thousand random numbers.[198] Random assignment to groups in this way insured theoretically that the experimental group and the control group were equal to each other.

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[198] These numbers were generated by utilizing a CIMS computing center routine at the Computing Center, Courant Institute of Mathematical Sciences, New York University, in Foundations of Behavorial Research, Fred N. Kerlinger (New York: Holt, Rinehart & Winston, Inc., 1973), pp. 714-717.

The nature of the sample, i.e., low-achieving, was based on the level of placement of the class within the school; informal sources such as observations, test results in other subjects, other teachers' comments; and formal sources such as school cumulative files, reading test results and the results on the Canadian Test of Basic Skills.

Before the groups were randomly selected or assigned to treatments, the pretest was administered to the entire grade seven class at the same time and place. Students who obtained seventy percent or higher were not required to participate in the experiment.

VARIABLES

In any scientific experiment the independent variable is the variable manipulated by the experimenter. In this study, the independent variable was:

the teaching method (instructional package).

The dependent variable, which is not manipulated, but is observed for variation as a presumed result of variation in the independent variable, was:

achievement or learning.

Manipulation of Variables

Kerlinger states that it is important when planning and executing research to distinguish between experimental and measured

variables.[199] He explains that any variable that is manipulated is an active variable while any variable that cannot be manipulated is an attribute variable.[200] In this study, the manipulated variable was the method of teaching.

Attribute variables such as intelligence, sex, socio-economic status, education, need for achievement, and attitudes are very difficult to manipulate and for the purpose of this study the writer assumed that the subjects came to the study with these so-called organismic variables ready-made.

Observation of Variables

For the actual experimental phase of the study the writer used an experimental design presented by Kerlinger.[201] This design is referred to as the pretest and posttest experimental-control group design. Campbell and Stanley point out how this design is widely used in educational research:

> One of the most widespread experimental designs in educational research involves an experimental group and a control group both given a pretest and a posttest....[202]

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[199]Fred N. Kerlinger, Foundations of Behavorial Research (New York: Holt, Rinehart & Winston, Inc., 1973), p. 38.

[200]Ibid.

[201]Ibid., p. 331.

[202]D. J. Campbell and J. E. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally and Co., 1963), p. 47.

A representation of this design is as follows:

R | Y_b X Y_a (experimental group)
R | Y_b $\sim$X Y_a (control group)

R indicates that the subjects were randomly assigned.

X indicates an experimental variable that was manipulated.

$\sim$X indicates an experimental variable that was a comparative constant.

Y_b indicates the pretest given to each group.

Y_a indicates the posttest given to each group.

Observation of the results of the pretest and posttest for both the experimental and control groups determined if there were significant differences between the two groups.

TESTS

To evaluate the effectiveness of the instructional package, a criterion-referenced measurement, as opposed to a norm-referenced measurement, was used. The major distinction between a criterion-referenced measurement and a norm-referenced measurement is in the type of information provided. Norm-referenced tests are administered in order to provide information about the performance of a student compared with that of others. A criterion-referenced measurement, however, gives more valuable information since each student's performance is compared to some specific standard or criterion. Popham and Husek describe criterion-referenced measures as those which are "used to ascertain an individual's status with respect to some criterion,

i.e., performance standard."[203]

Two types of criterion-referenced tests were used in this study. They were a pretest and a posttest. The pretest was criterion-referenced to the objectives the writer intended to teach in the instructional module. It determined if the learner had mastered a criterion skill considered a prerequisite to his commencing the instructional package.

The posttest was parallel and in some ways identical to the pretest. Like the pretest, it also measured the objectives taught in the instructional program and provided an index of efficacy of the treatment.

Because of the nature of the low-achieving student, both the pretest and the posttest were subjected to the Thorndike-Lorge list of thirty thousand words,[204] to ensure that the reading level of the material was appropriate to the level of the student.

Since tests may be used again and again, the writer took some time to determine the reliability of the pretest and posttest. Reliability refers to whether a test and each item in the test consistently measures the behavior for which it was intended. Popham and Husek point out that "although it may be obvious that a criterion-referenced test should be internally consistent, it is not obvious how to assess the

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[203] W. James Popham and T. R. Husek, "Implications of Criterion-Referenced Measurement," Criterion-Referenced Measurement: An Introduction, ed. W. James Popham (Englewood Cliffs, New Jersey: Educational Technology Publications, 1971), p. 20.

[204] Edward L. Thorndike and Irving Lorge, The Teacher's Word Book of 30,000 Words (New York: Bureau of Publications, Teachers College, Columbia University, 1959), pp. 1-208.

internal consistency."[205] For the purpose of this study, test items were reviewed and revised if they were consistently missed by a group of six students from a senior geography class (grade ten), who, according to results on school tests and the advice of other social studies teachers, already knew the skills the items supposedly tap.

To decide on the content validity or relevancy of the tests to the behaviors delimited by the criterion the writer asked a social studies teacher at Beothuk Collegiate and a testing expert with the Green Bay Integrated School Board to check the tests and make comments and suggest revisions. Both the pretest and the posttest underwent formative evaluation before they were actually used to assess student performance. After designing the tests, the writer administered them to six students (neither the same individuals who served as the initial trial group in the formative evaluation of the instructional package nor those from the actual target group). These students read and explained aloud what was meant by both the directions and questions and actually responded to each question in the intended response format. Several changes had to be made in the actual wording of some questions.

Application of Tests

Before groups were randomly assigned to treatments, the pretest

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[205] W. James Popham and T. R. Husek, "Implications of Criterion-Referenced Measurement," Criterion-Referenced Measurement: An Introduction, ed. James W. Popham (Englewood Cliffs, New Jersey: Educational Technology Publications, 1971), p. 29.

was administered to all the seventh graders in the low-achieving class at the same place and time. The results on the pretest determined whether the students had the necessary prerequisite skills and, in that sense, acted as a screening device.

Before separating the two groups for the actual treatments, the classroom teacher explained that the next topic in geography would be map skills, specifically latitude and longitude. She also explained that another teacher would be giving the lesson. It was also emphasized that because of the nature of the topic it would be necessary to work in two groups.

The experimental group was sent to the library under the supervision of a co-operating teacher. The experimenter then proceeded to teach the control group by using the lecture method of instruction. The material used was exactly as presented in the text. Later each member of the experimental group received the instructional package individually. In order to prevent discussion among the students, all members of the experimental group received the instructional package during one day of classes. It was also agreed by the consenting homeroom teacher that as soon as a student returned to his class the next experimental subject would be sent to the resource center.

After the treatments, both experimental and control groups received the posttest. The members of the control group wrote the posttest as a group, whereas, because the instructional package is individualized, each member of the experimental group wrote the posttest individually immediately after completing the module. Copies of the pretest and posttest are included in Appendix E.

DATA AND STATISTICAL ANALYSIS

Since this thesis project was mainly developmental in nature as as such stressed the formative evaluation of materials and student interaction with them, summative evaluation involving rigorous statistical analysis was considered secondary. In order to determine the effectiveness of the instructional package, descriptive statistics and simple tests of hypotheses were employed.

Table 1 provides a summary of results from the pretest and posttest for both the control and experimental groups. Figures 13, 14, 15, and 16 (see Appendix F) graphically illustrate how the results of the control and experimental groups compare on both the pretest and posttest.

Mean scores were calculated for the pretest and posttest for each treatment group. The data were treated by means of statistical inference. T-tests of the significance of differences between means were computed. No significant differences were found between the mean scores of the experimental and control groups on initial pretest measures (Table 2). However, a difference significant at the .01 level was found between the mean scores of both groups on the posttest (Table 3). Since the t-ratio was larger than the level of confidence, which with nine degrees of freedom was 2.821, sub-hypothesis H_{0_1} was rejected.

The experimenter felt that during the study the effect of experimental manipulation of treatment groups was strong. As a result, a t-test was also used to analyze gain or change scores (Table 4).

Table 1[206]

Scores Obtained by Students on Pretest-Posttest

Control Group			Experimental Group		
Pretest	Posttest	Gain Score	Pretest	Posttest	Gain Score
24	30	6	20	50	30
28	35	7	45	65	20
32	40	8	24	50	26
36	50	14	40	65	25
32	35	3	35	70	35
44	40	-4	28	45	17
28	35	7	39	40	5
28	30	2	44	60	16
32	30	-2	32	25	-7
32	45	13	40	60	20

[206]Subjects were not matched.

Table 2

Tests of Significant Differences Between Means of the Experimental and Control Groups on the Pretest (Summary of Relevant Data)

	Experimental Group	Control Group
	Pretest Score	Pretest Score
Mean	34.3	31.6
Median	35.0	32.0
Variance	70.01	30.04
Standard Deviation	8.37	5.48
Standard Error of the Mean	2.65	1.73
t value = 0.85		

$.01t_9 = 2.821$ $t < .01t_9$ No significant difference

Table 3

Tests of Significant Differences Between Means of the Experimental and Control Groups on the Posttest (Summary of Relevant Data)

	Experimental Group	Control Group
	Posttest Score	Posttest Score
Mean	53	37
Median	55	35
Variance	190.0	45.6
Standard Deviation	13.78	6.75
Standard Error of the Mean	4.36	2.13
t value = 3.299		

$.01t_9 = 2.821$ $t > .01t_9$ Reject H_{0_1}

Table 4

Tests of Significant Differences Between Means of the Experimental and Control Groups' Gain Scores.

(Summary of Relevant Data)

	Experimental Group	Control Group
	Gain Score	Gain Score
Mean	18.7	5.4
Variance	149.8	33.8
Standard Deviation	12.24	5.82
Standard Error of the Mean	3.87	1.84
t value = 3.100		

$.01t_9 = 2.821$ $t > .01t_9$ Reject H_{O_2}

The t-ratio proved to be significantly larger than the level of confidence (.01) and therefore sub-hypothesis H_{O_2} was also rejected.

The results of this study indicate that there is a highly significant difference between the control group which was taught by the conventional textbook-lecture method of instruction and the experimental group which received the instructional package. Therefore, hypothesis H_O was rejected.

SUMMARY

Chapter four outlines the summative evaluation procedures employed to determine whether the instructional materials were ef-

fective. The chapter started with a restatement of the problem followed by a specification of the major hypothesis for the study and the accompanying sub-hypotheses. Limitations of the study were also outlined.

Selection of the sample for the study consisted of a class of twenty low-achieving grade seven students from Beothuk Collegiate, Baie Verte, Newfoundland.

In the light of the nature of the study, which was developmental as opposed to pure research, rigorous statistical analyses were not employed. Nevertheless, some statistical analysis was necessary to determine the effectiveness of the instructional package. For this reason, descriptive statistics and simple tests of hypotheses were used.

Variables such as sex, intelligence, socio-economic status, education, etc., were not considered. The only variables manipulated were methods of teaching.

The pretest and posttest experimental-control group design was used in order to obtain statistical data. For this reason, both the pretest and the posttest were criterion referenced as opposed to norm referenced and were validated by a social studies teacher at Beothuk Collegiate and a testing expert with the Green Bay Integrated School Board.

A series of four tables presented the data obtained from the study. The t-test was used to compare the means of both the experimental and control groups' pretest, posttest, and gain scores to determine whether there was a significant difference (at the

.01 level of significance) between the scores.

The analysis of data showed that there was no significant difference between the control and experimental pretest scores. However, there was a significant difference between the control and experimental posttest scores, as well as a significant difference between the control and experimental gain scores.

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

Having developed and tested an instructional unit to teach the basic map reading skills of latitude and longitude to low-achieving students entering junior high school, chapter five examines the findings revealed by the analysis of data in relation to similar reported findings of other investigators. It also examines generalizations that can be derived from the study. Finally, recommendations and suggestions for further study are outlined.

FINDINGS

The findings of this study support the hypothesis that the instructional package is a better method of teaching low-achieving students than the conventional textbook-lecture method. The findings agree with those of Richason[207] which concluded that the audiovisual tutorial program of instruction was superior to the traditional expository approach. The contentions of Harrell[208] and Stuck and Manatt[209] that

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[207] B. F. Richason, Jr., "Teaching Geography by the Audio-visual Tutorial Method," Audiovisual Instruction, XV, 2 (February, 1970), 41-44.

[208] Burt Harrell, "Audiovisual Programs and Science Instruction," Audiovisual Instruction, XV, 2 (February, 1970), 25-26.

[209] D. L. Stuck and R. P. Manatt, "A Comparison of Audio-tutorial and Lecture Methods of Teaching," Journal of Educational Research, LXIII, 9 (May-June, 1970), 414-418.

the audiovisual method of instruction is superior to the conventional lecture method is also supported by the findings.

It would also appear that the findings of Joyce[210] and Rushdoony,[211] which stated that systematic instruction is preferable to casual and incidental treatment, could be supported by this study.

The findings of the study also raise some questions about the reading level of social studies materials. The statement of Covell[212] that weaknesses in reading are a prime factor of failure in social studies appears to be very valid. However, the results of this study indicate that low-achieving students who were exposed to an aural-visual program of instruction did significantly better than students who were required to read the prescribed textbook material.

CRITICAL ANALYSIS OF STUDY

Caution should be exercised in interpreting the results of this study until the criterion tests (pretest and posttest) have been refined and tested further and until the experiment has been repeated in other areas of the province and with larger samples.

Although the research design used for this study has been frequently employed in the field of educational research, there were

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[210] William W. Joyce, "The Development and Grade Placement of Map and Globe Skills in the Elementary Social Studies Program" (unpublished Doctor's dissertation, Northwestern University, 1964).

[211] Haig A. Rushdoony, "A Child's Ability to Read Maps: Summary of the Research," Journal of Geography, LXVII (April, 1968), 213-223.

[212] Harold M. Covell, "Reading in the Social Studies," Social Education, XXI (January, 1957), 14-16.

certain procedural deficiencies which may have decreased the external validity of the experiment. The main area of difficulty is the pretest. As Kerlinger points out, "the pretest can have a sensitizing effect on subjects."[213] Subjects in both the experimental and control groups who were required to take a pretest prior to treatment may have become sensitized to the experimental manipulation and as a consequence results on the posttest may not be entirely valid. However, because testing is a normal function of the school in which the study was conducted, it is the writer's contention that sensitizing to the pretest was minimal.

Throughout the duration of the experimental phase of the study the experimental and control groups were physically separated. However, some leakage of information did occur. The avant garde situation of the experimental group may have inhibited the control group since some students in the control group expressed dissatisfaction with their educative activity when they learned of the relative freedom and student involvement enjoyed by the group using the instructional unit.

CONCLUSIONS

From the findings of this study, the following conclusions can be drawn regarding the development of multi-media instructional packages to teach basic map reading skills to low-achieving junior high school students.

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[213] Fred N. Kerlinger, Foundations of Behavorial Research (New York: Holt, Rinehart & Winston, Inc., 1973), p. 336.

1. Both the research studies in general and the findings of this study in particular suggest that multi-media instructional units are better than the traditional textbook-lecture approach for teaching geographic concepts to low-achieving junior high school student.

2. The review of literature and empirical research indicates that multi-media instructional units are consistent with modern theories of learning and conducive to achieving goals accepted for the social studies as indicated by Jarolimek's guidelines for elementary social studies.[214]

3. The use of the multi-media instructional unit makes individual instruction feasible and permits the student to proceed at his own best rate. It could be used as a method of removing an individual from a class and treating the student's learning as a personal prescription for success.

On the basis of the statistical information collected from the study, the research cited in the report, and the supportive literature quoted, it can be concluded that instructional packages are worth considering as possible alternatives or supplements to the social studies instruction which obtains in many classrooms. While they are not suggested as any kind of final answer, the writer feels that they have

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[214] John Jarolimek, Guidelines for Elementary Social Studies (Washington, D. C.: Association for Supervision and Curriculum Development, NEA., 1967).

the potential to correct many of the shortcomings of the narrowly conceived textbook-lecture teacher centered methodology.

RECOMMENDATIONS

What follows is a list of recommendations for further research and a list of suggestions that may be implemented:

1. Because the nature of this project was basically developmental, experimental testing using elaborate statistical methods was not emphasized. It is suggested that a further study, using more detailed statistical methods, might be undertaken to test the instructional module in junior high schools in other areas of the province.

2. According to the research conducted, basic map reading concepts such as latitude and longitude are supposed to be taught at the elementary school level. It is suggested that the instructional package (or an adaptation thereof) be administered to students at the elementary school level (grades four to six) to see if it could be effective for them as a method of instruction.

3. Very little research has been conducted dealing directly with instructional packages. Therefore, the writer recommends that studies be carried out in Newfoundland in order to assess the viability of such an approach for the local schools.

4. A study might be initiated to investigate how many schools in the province of Newfoundland and Labrador teach map skills using the sequence proposed by the Newfoundland and Labrador Department of

education in the booklet Map and Globe Skills: K-7.[215]

5. There is a definite need for a study to determine teachers' attitudes toward the teaching of map skills, particularly at the primary and elementary levels.

6. The instructional unit designed for this study was developed specifically for low-achieving students entering junior high school who lack map reading concepts and skills. These same students are often poor readers and as a result the program was also geared to this problem. A study should be carried out to ascertain if there is a relationship between reading achievement and the development of map reading concepts and skills.

Besides recommending other related areas where research could be conducted, there are a number of suggestions not involving research that originate from this project:

1. The social studies curriculum should be adjusted to meet the diversity of needs which stem from the children's various backgrounds. Children from culturally different backgrounds are often not ready to fit into the social studies program as it now exists.

2. There is a need for in-service education in which teachers are exposed to new ideas. The initiative for such in-service education can come from the teacher, the administrator, or the social studies program co-ordinator.

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[215]Division of Curriculum, Map and Globe Skills: K-7 (St. John's, Newfoundland: Department of Education, n.d.).

3. The university, provincial boards of education, district supervisors (or program co-ordinators), and others should embark upon a more strenuous program to train educators in the theoretical and practical aspects as well as the limitations of media. How to interpret the message of media and select more appropriate materials should also form a part of the program.

4. Social studies teachers in particular should become more aware of the characteristic qualities of media in social studies.

5. Special attention needs to be paid to the research on maps, tools which are indispensible in the learning of the social studies. More and effective use must be made of them.

Chapter 6

SUMMARY

The purpose of this project was to develop and test an instructional package to teach the basic map reading concepts of latitude and longitude to low-achieving students entering junior high school. According to the way the present social studies curriculum in Newfoundland is set up, these students are supposed to have been taught these basic concepts prior to entering junior high school. However, because individual growth and cognitive development do not always proceed smoothly through the grades, not all students entering junior high school are necessarily at a grade seven level. The teacher must be prepared to reshape and make adjustments in the curriculum and to develop instructional materials to teach such basic ideas.

The development of any instructional unit to teach any skill or concept in social studies needs to be arranged so that it will bring about a kind of change in a student which is called learning. This requires a consideration of learning theory as it relates to instructional development.

Most of the learning experts and psychologists agree that learning theories and instructional theories are interdependent and that any attempts to develop instructional procedures should make use of what is known about learning. An understanding of learning theory will invariably lead to the development of instructional materials that are matched to the cognitive development of a child. When a child's cognitive structure and subject matter are mismatched, learning is impeded. Each future step

in the cognitive development sequence will depend upon the successful completion of past stages. There appears to be general agreement that instructional sequencing of subject matter content ought to be matched to a child's cognitive development level and not rigidly tied to specific grades.

A review of the related literature and empirical research reveals that there is a definite need for skill development because skills are a vitally important component of the total social studies curriculum. This need is nowhere more apparent than in the area of map reading skills. However, due to the nature of the low-achieving student and the fact that students are different mentally, map skill development does not always progress in a sequential pattern according to some established hierarchy. The teacher must be prepared to cater to the individual.

The research also indicates that most social studies textbooks are at a reading level much too high for the low-achieving student and that instruction must be based extensively on activities which de-emphasize reading.

Studies involving the use of multi-media techniques suggest that low-achieving students, particularly those with a reading problem, profit more through the use of audio and visual modes of presentation of materials than by means of the textbook method. Teachers must be prepared to construct media oriented instructional materials that will effectively meet the needs of these low-achieving students.

Construction of materials by the classroom teacher is often the only way in which an individual child's learning needs can be

appropriately met. However, the development of any instructional material must be performed in a very systematic manner. In the study conducted by this writer the identification of the specific learning problem in the light of the learner and his specific needs was the first order of priority. The next step, the formation of instructional objectives, depended upon the specific task and related subtasks. Once the objectives had been clearly identified, the writer proceeded with the job of matching the material to the student's preferred mode of presentation, bearing in mind his reading level.

Once developed, the instructional package underwent an intensive formative evaluation involving the use of content and procedural specialists, classroom teachers, and a small sample of students. Based on the results of the formative evaluation revisions were made to the instructional package before it was subjected to a summative type of evaluation.

The summative evaluation of the instructional unit for this study was conducted using one low-achieving grade seven class of twenty students. The students were randomly assigned to two groups. The control group received the lecture plus accompanying textbook material while the experimental group received the instructional package. The subjects were tested by using a criterion referenced pretest - posttest constructed by the experimenter. A pretest and posttest experimental-control group design was employed.

A t-test was used to compare the means of both the experimental

and control groups' posttest scores. A significant difference was found to exist between the two groups at the .01 level of significance. Therefore, it was concluded that the instructional kit is a better method of teaching basic map reading concepts such as latitude and longitude to low-achieving students entering junior high school than is the traditional textbook-lecture method.

The reader was advised to exercise caution in interpreting the results of this study until the criterion tests have been further refined and until the experiment has been repeated with larger and more widely distributed samples. Among the suggestions offered for further study was one to determine whether or not the instructional unit could be an effective method of teaching basic map reading concepts to elementary school children (grades four to six).

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APPENDIX A

SLIDES AND TAPES UNDER

SEPARATE COVER

APPENDIX B

AUDIO SCRIPT

for

Map Reading Skills

Latitude and Longitude

by

LLOYD G. GREENHAM

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
1	Focus	
2	Turn on the tape now and listen carefully.	The program you are about to do has been developed to introduce you to latitude and longitude, two very important ideas needed to help you understand maps and globes and how to use them. (brief pause) Each time you hear this sound - BEEP - you should turn to the next slide. (brief pause) It is very important that you listen

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		carefully to the tapes and that you follow the instructions exactly as told. If you do miss something along the way or you don't quite understand something, feel free to rewind the tape and start again or ask your teacher for help.
		BEEP
3	Turn to Page 1	The ideas that you should understand after completing this program are found on pages one, two, and three of your booklet.
		(brief pause)
		Please turn to page one of your booklet and study the ideas. Turn off the

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		tape recorder while you do so. Turn it back on when you are ready to begin. Turn off the tape recorder - NOW.
		(few seconds pause)
		You are now ready to begin the program.
		BEEP
4	Title slide	BEEP
5	Produced by	BEEP
6	Picture of globe with latitude and longitude lines emphasized.	BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
7	Picture of North America with latitude and longitude lines emphasized.	
		BEEP
8	Slide showing list of words: Degree, Latitude, Parallel, Equator, Longitude, Meridian, Prime Meridian, and Grid.	Here is a list of important words that you will see and hear as you work through this unit. These words may cause some problems so let us review them together.
		BEEP
9	Slide showing list of words and definitions with first two definitions emphasized.	DEGREE - means to divide into equal distances on a map or globe. (pause)

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		LATITUDE - imaginary or make-believe lines on a map or globe which go from east to west.
		BEEP
10	Slide showing list of words and definitions with the third and fourth definitions emphasized.	PARALLEL - another name for latitude.
		(pause)
		EQUATOR - the zero degree latitude line that goes around the middle of the earth from east to west.
		BEEP
11	Slide showing list of	

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
	words and definitions with the fifth and sixth definitions emphasized.	LONGITUDE - imaginary or make believe lines on a map or globe which go from the North Pole to the South Pole. (pause) MERIDIAN - is another name for longitude. BEEP
12	Slide showing list of words and definitions with the seventh and eight definitions emphasized	PRIME MERIDIAN - the zero degree line of longitude that goes from the North Pole to the South Pole. (pause) GRID - a combination of latitude and

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		longitude lines on a map or globe.
		BEEP
13	Cartoon saying "Are you ready?"	Having reviewed these terms, you are now ready to start the unit.
		If you are listening carefully and following instructions, the correct slide before you should be a cartoon saying "Are you ready?"
		BEEP
14	DEGREES (de-grees)	You already know that the earth is shaped like a giant circle and like a circle it can be divided into a

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		number of equal parts which we call DEGREES. (pause) BEEP
15	Two circles, one smaller than the other, divided into 360°.	You will notice that the top diagram shows that there are three hundred sixty of these degrees around a circle. The bottom diagram, although smaller, also shows that there are three hundred sixty degrees. This must mean that the size of a circle does not make any difference. Any circle has three hundred sixty degrees. BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
16	Slide of photo of world in space.	This means that the earth, which is shaped like a circle, must also have three hundred sixty degrees. BEEP
17	One half of circle shaded in.	If a circle has three hundred sixty degrees, then half a circle must have (brief pause) One hundred eighty degrees. BEEP
18	One quarter of a circle shaded in.	And one quarter of a circle must have (brief pause)

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		Ninety degrees.
		BEEP
19	Two diagrams of world.	What do you notice in diagram A? Well, except for the land and water it is round. You probably notice as well that the world is divided into two equal parts by a line marked zero. You will also notice that in the second diagram if you could walk from this zero line to the North Pole, you would have walked one-quarter of the way around the world or you would have covered —— ninety degrees.
		BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
20	Picture of circle with half circle emphasized.	Let us divide the world another way but still have the North Pole at the top. If we now walk from this new zero line to the North Pole, we have gone one-half of the way around the world or --- one hundred eighty degrees. BEEP
21	Writing on chalkboard.	One more thing before we leave degrees for awhile. To have to write out the word degrees every time we wish to write one degree, two degrees, three degrees, and so on can be a real nuisance. BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
22	Close-up showing symbol for degrees.	So, to solve this problem, people have invented a symbol to stand for degrees. It is a small circle placed just above the number of degrees. BEEP
23	Circle with latitude lines.	Geographers sometimes draw lines on a map to show the location of a place. Some of these lines are drawn across in an east to west direction. These lines are called..... BEEP
24	Latitude.	Latitude lines. Latitude lines are

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		imaginary or make believe lines drawn on a map or globe in an east to west direction.
		BEEP
25	Repeat of slide no. 23.	You probably notice that these lines do not touch but that they go all the way around the world. Because latitude lines do not [illegible], they are sometimes referred to as.....
		BEEP
26	The word parallel written several times.	.....PARALLELS.
		BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
27	Slide redefining latitude.	Remember then -- latitude lines are imaginary lines that run from east to west and are sometimes called parallels because they do not meet. BEEP
28	Circle with the 0^{o} lat. line shown.	The first latitude line put on a world globe is usually the zero degree line. because it circles the earth at its center. Because it is half way between the North Pole and the South Pole, it has been called the..... BEEP
29	Circle with the 0^{o} lat. line called - Equator.	EQUATOR. The equator is the longest latitude line since it goes around

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		the middle of the earth.
		BEEP
30	Showing Northern and Southern Hemispheres.	Because the equator goes around the middle of the earth, it divides the world into two halves. These halves are called.....HEMISPHERES.
		BEEP
31	Circle showing latitude lines from 0 to 90.	It was mentioned earlier that latitude lines could be used to find location. Let us see how this is done. First of all, we have to remember that if we were to walk from the equator to the North Pole we would cover 90°. This

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		means that we cannot have a latitude greater than 90°.
		BEEP
32	1° lat. = 113 kilometers.	By numbering the latitude lines with degrees, we can use the latitude lines to find distances as well as direction because.....One degree of latitude equals approximately one hundred thirteen kilometers. Try to think of a place you might visit by car that is over one hundred kilometers away.
		BEEP
33	How to determine distance by using latitude lines.	The slide before you shows that point A is located at fifteen degrees lat-

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		itude north of the equator - or - the same point is one thousand six hundred ninety-five kilometers.
		If you are not quite certain how we get the answer one thousand six hundred ninety-five, turn off the tape and study page four of your booklet.
		(long pause)
		BEEP
34	Cartoon.	Before we can give the location of some points in terms of latitude, we must first understand that there is a

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		correct method for writing latitude on paper.
		BEEP
35	Lat.	First of all we must write the abbreviation or short form for latitude. The abbreviation for latitude is..... l-a-t.
		BEEP
36	20°	Then we write down the number of degrees. For example.....20°.
		BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
37	Lat. 20° N.	And finally we add the letter N or S depending on whether the latitude point is above or below the equator. BEEP
38	Map to find a lat. location.	Putting what we have learned all together, we can see that point A on the map before you is located at latitude twenty degrees North. BEEP
39	Lat. 20° N.	On paper, this is how the location of point A would be shown. BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
40	Review of latitude.	Now let us quickly review the main points concerning latitude learned so far. These points are also listed in your booklet on page 5. BEEP
41	Seven points about latitude.	1. The unit of measurement used on maps and globes is degree. 2. Latitude lines are imaginary. 3. Latitude lines run from east to west 4. The 0° latitude line is the equator. 5. The equator is the longest latitude line. 6. Latitude lines are parallel.

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		7. There are 90° latitude in the Northern Hemisphere and 90° in the Southern Hemisphere.
		BEEP
42	Cartoon.	You have now come to the end of Part I. Remove the tape from the recorder and replace it with Tape B called ..... Latitude and Longitude - Part II.
		If you feel like resting a little before beginning Part II, turn off the tape recorder when you have replaced Tape A with Tape B and turn it back on when you are ready to continue.
		.....

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		BEEP
43	Part II.	You are now ready to start the second part of the program.
		BEEP
44	Longitude.	To help you further in locating places on the earth's surface, a second set of imaginary or make believe lines can be drawn from north to south. These imaginary lines are called longitude, and like latitude lines, which help us locate places north or south of the equator, longitude helps us locate places east and west.
		BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
45	The word Meridians written several times.	Longitude lines are often called meridians. BEEP
46	Circle showing longitude lines.	Unlike latitude lines, meridians or longitude lines meet at the poles. BEEP
46	Equator = 0° lat. ? = 0° long.	Just as the equator is at 0° latitude, there is also a meridian of 0° longitude. It is called..... BEEP
48	The word Prime Meridian written several times.	The Prime Meridian.

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
49	Map showing the Prime Meridian passing through Greenwich, England.	The Prime Meridian passes through Greenwich, England, and is sometimes called the Greenwich Meridian. The reason why it passes through Greenwich is because all the countries of the world agreed that this would be the location of the 0^{o} longitude line. Your booklet contains a world map which shows exactly where the Prime Meridian is located. BEEP
50	Turn off the tape and turn to page 6 of your	Turn off the tape and study the map on page 6 of your booklet for awhile.

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
	booklet.	Turn the tape recorder back on when you are ready to continue. (long pause) Just as the equator or 0° line of latitude divides the globe into two halves, the Northern and Southern Hemispheres..... BEEP
51	Diagram showing Eastern and Western Hemispheres.	.....so does the Prime Meridian, with the help of the International Date Line, divide the globe into the Eastern and Western Hemispheres. BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
52	North Pole view of radiating longitude lines.	If we look down on a globe from the North Pole, we will see that there are one hundred eighty degrees of longitude on each side of the Prime Meridian. BEEP
53	Circle with longitude lines.	Unlike latitude lines, which go around the globe from east to west, and do not meet because they are parallel, longitude lines are drawn from the North Pole to the South Pole and therefore <u>all</u> longitude lines meet at the poles. BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
54	Listen carefully. Turn to page 7 of your booklet.	Turn off the tape and study the diagram on page 7 of your booklet to see the difference between latitude and longitude. When you are ready, turn the tape back on and continue. (pause) As with latitude, there is a correct way to write longitude. BEEP
55	Long.	First we write the abbreviation for longitude..... l-o-n-g. Then we write down the number of degrees. For example.....

BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
56	20°	(pause) BEEP
57	Long. 20° E.	Finally, we add the letter E or W for East or West depending on whether the longitude point is to the right or left of the Prime Meridian. BEEP
58	Map with longitude lines.	Putting what we know about longitude together, we can say that point A on the map before you is located at..... longitude twenty degrees East. BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
59	Long. 20° E.	On paper, this is how the location of point A would be shown. BEEP
60	Review of longitude.	Now let us review the main points learned concerning longitude. These points are also listed in your booklet on page 8. BEEP
61	Five points about longitude.	1. Longitude lines are imaginary lines. 2. Longitude lines run from North to South. 3. The 0° longitude line is the Prime Meridian.

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		4. Longitude lines meet at the poles. 5. There are one hundred eighty degrees longitude in each of the Eastern and Western Hemispheres.
		BEEP
62	Listen carefully.	When latitude and longitude lines are placed together on a map or globe a grid is formed. A grid, then, is a combination of latitude and longitude lines.
		BEEP
63	Globe with latitude and longitude lines combined.	When the latitude and longitude lines are placed together on a globe what

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		is formed is called a.....(pause) .....globe grid.
		BEEP
64	Map with latitude and longitude lines combined.	When the latitude and longitude lines are placed together on a map what is formed is called a.....(pause) .....map grid.
		BEEP
65	Latitude and longitude lines together help make exact measurements and locations.	Latitude and longitude lines together help make exact measurements and locations.
		BEEP

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
66	Make believe map with latitude and longitude lines.	Look at the make believe map and see if you can determine the latitude and longitude location of point A. BEEP
67	Same make believe map with latitude lines only.	First, let us look at the map as it would be with latitude lines only. Using the equator as the starting point, we can first decide whether point A is above or below the equator (or the 0^{o} latitude line). In this case, it is above the equator. Therefore, it has a north latitude location. Now, count the number of degrees north latitude, starting from the equator. You will find that point A is on the

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		10^{o} north latitude line. So we can now write the latitude location of point A as.....Lat. 10^{o} N.
		BEEP
68	Same make believe map with longitude lines only.	Now, let us look at the map with longitude lines only. From the 0^{o} meridian or Prime Meridian we notice that point A is on the western side of the Prime Meridian (or the 0^{o} longitude line). This means that the point will have a west longitude. Count the number of degrees west from the Prime Meridian and you will find that it is on the 10^{o} west longitude line. The longitude location of point A is.....Long. 10^{o} W.

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		We can now write the exact location of point A as.....
		BEEP
69	Lat. 10^{o} N.; Long. 10^{o} W.	Latitude ten degrees North and longitude ten degrees West.
		BEEP
70	The End	You have now come to the end of the slide/tape program. If you are still not quite sure how we got the latitude and longitude location of point A on the make believe map, turn to pages 9, 10, and 11 of your booklet.

SLIDE NO.	SLIDE DESCRIPTION	AUDIO SCRIPT
		Please turn off the tape recorder and slide projector now.

APPENDIX C

STUDENT'S BOOKLET

for

Map Reading Skills

Latitude and Longitude

by

LLOYD G. GREENHAM

TO THE STUDENT

The program Map Reading Skills: Latitude and Longitude consists of a series of slides, audio tapes, and student booklets. Work through the program by listening to the tapes, viewing the slides, and returning to this booklet only when indicated on the audio tapes.

The ideas presented in this booklet are designed to help you understand some of the ideas presented in the slide-tape program.

Skills

The unit Map Reading Skills: Latitude and Longitude has been designed to introduce and develop the following ideas:

1. A degree is a unit of measurement used on globes and maps for location and distance.
2. The equator is a line drawn around the globe halfway between the north and south poles.

(CONTINUED ON PAGE 2)

3. The equator is the 0° latitude line.

4. Lines of latitude are circles drawn around a globe parallel to the equator.

5. Lines of latitude in the northern hemisphere are called north latitude and in the southern hemisphere, south latitude.

6. Circles of latitude decrease in size as one goes towards the poles.

7. There are 90° north latitude and 90° south latitude.

8. Lines of longitude are circles that go through the north and south poles.

9. Longitude is measured in degrees from the 0° line called the prime meridian.

10. There are 180° east longitude and 180° west longitude.

11. Longitude lines show directions east and west of the prime meridian.

(CONTINUED ON PAGE 3)

12. Latitude and longitude lines combine to form a grid.

13. Latitude and longitude lines together can be used to determine exact locations.

(TURN THE TAPE RECORDER BACK ON WHEN YOU ARE READY)

USING LATITUDE FOR MEASURING DISTANCE

We already know that _____ $1^{\circ} = 113$ KILOMETERS

Therefore, _____ $15^{\circ} = 113$ KM X 15

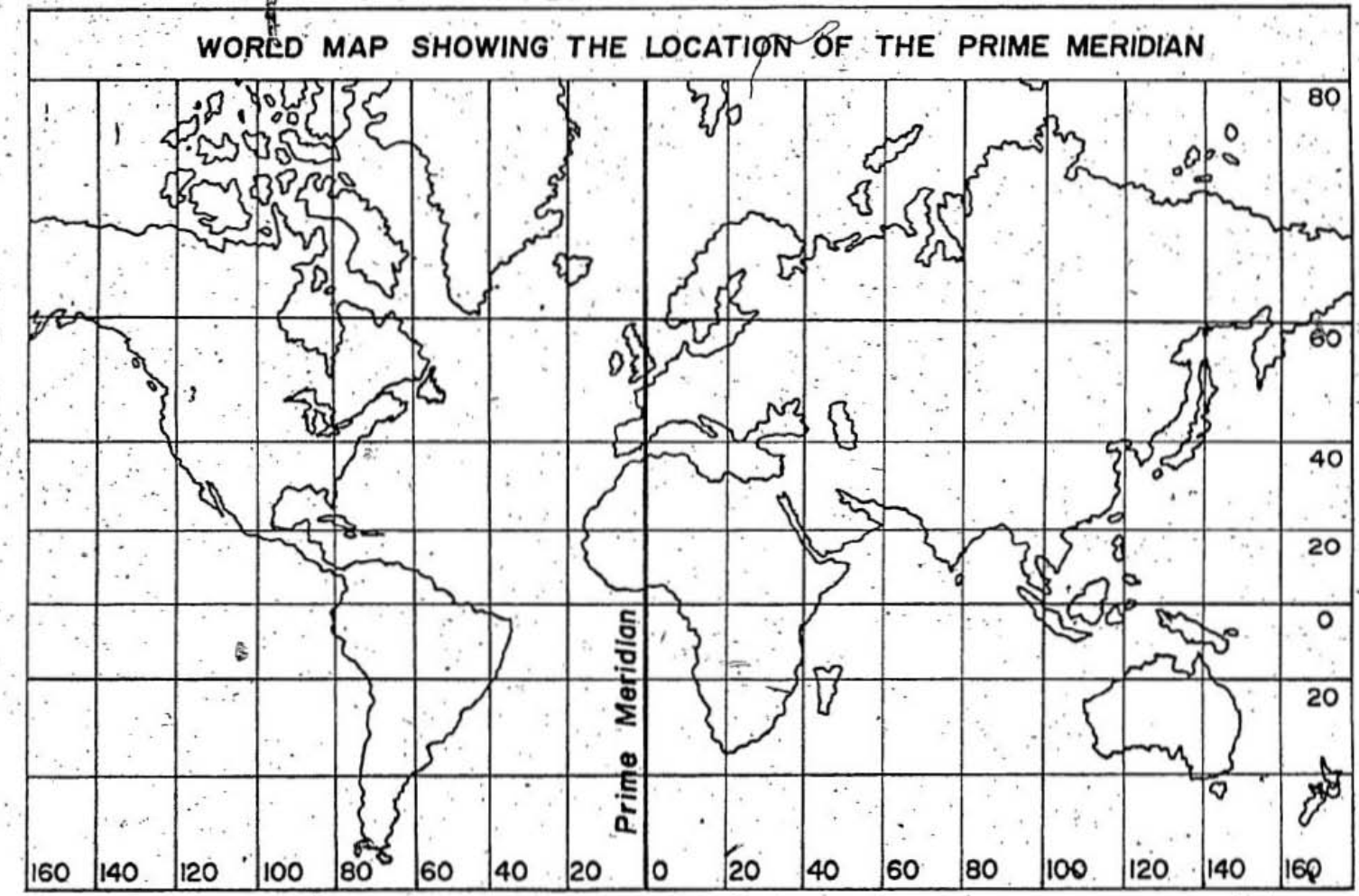
or

1695 KILOMETERS

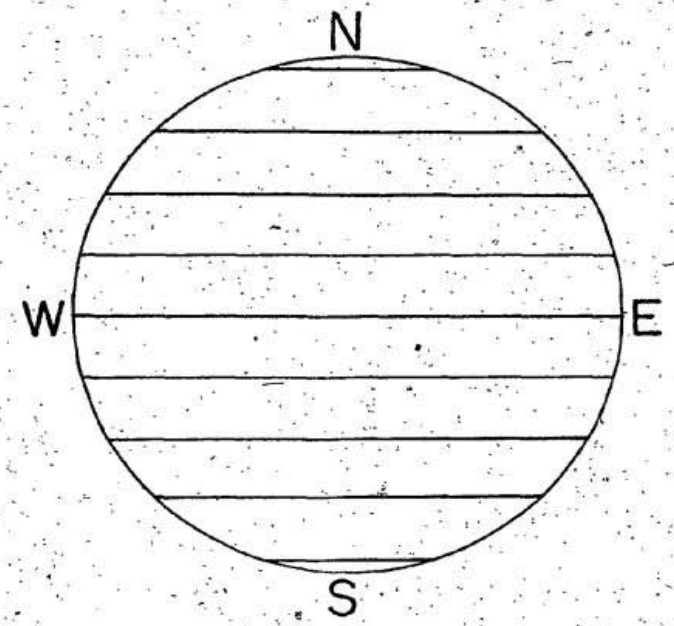
(Return to the tape when you are ready. If you still do not understand, ask your teacher for help)

REVIEW OF LATITUDE

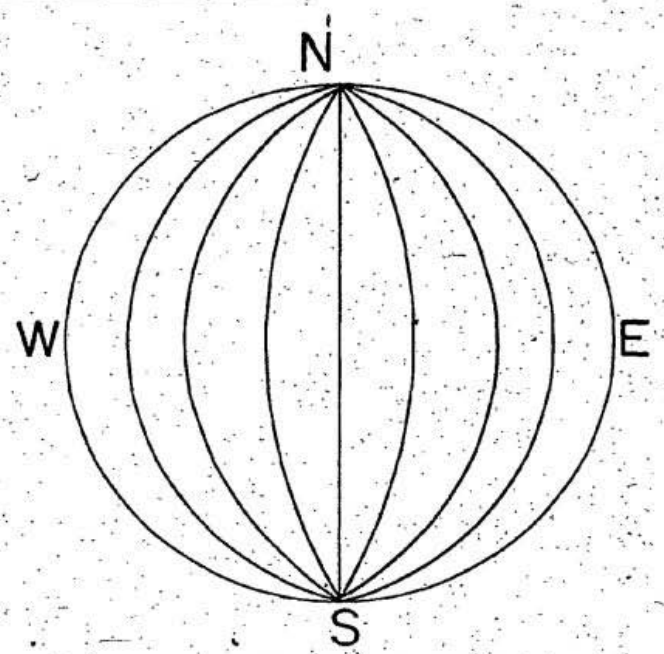
1. The unit of measurement used on maps and globes is the degree.
2. Latitude lines are imaginary.
3. Latitude lines run from east to west.
4. The 0° latitude line is the equator.
5. The equator is the longest latitude line.
6. Latitude lines are parallel.
7. There are 90° latitude in the southern hemisphere and 90° latitude in the northern hemisphere.


WORLD MAP SHOWING THE LOCATION OF THE PRIME MERIDIAN
Prime Meridian
80
60
40
20
0
20
160
140
120
100
80
60
40
20
0
20
40
60
80
100
120
140
160

LATITUDE and LONGITUDE LINES



LATITUDE LINES

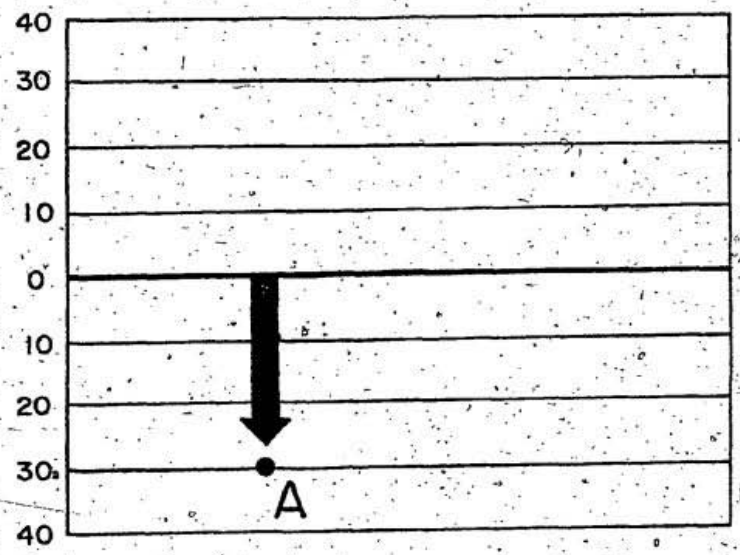


LONGITUDE LINES

REVIEW OF LONGITUDE

1. Longitude lines are imaginary lines.
2. Longitude lines run from north to south.
3. The 0° longitude line is the prime meridian.
4. Longitude lines meet at the poles.
5. There are 180° longitude in each of the eastern and western hemispheres.

DETERMINING LATITUDE AND LONGITUDE LOCATION

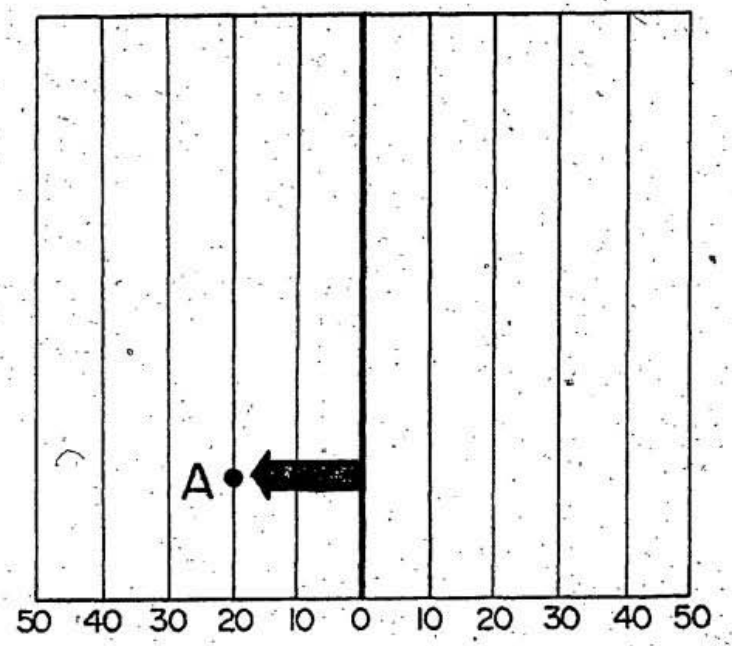


Latitude of point A is

Lat. 30° S

9

DETERMINING LATITUDE AND LONGITUDE LOCATION

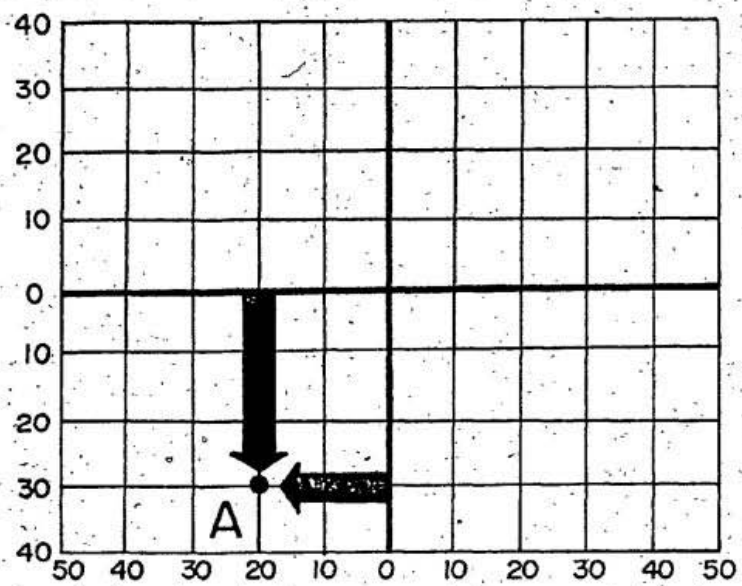


Longitude of point A is

Long. 20° W

10

DETERMINING LATITUDE AND LONGITUDE LOCATION

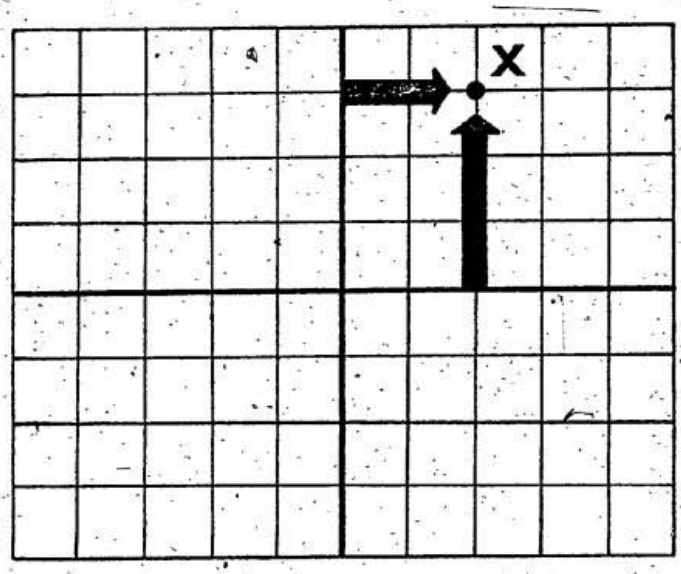


The location of point A is

Lat. 30° S — Long. 20° W

11

DETERMINING LATITUDE AND LONGITUDE LOCATION



Try this one:

The location of point X

is

Lat._____

Long._____

APPENDIX D

TEACHER'S MANUAL

for

Map Reading Skills

Latitude and Longitude

by

LLOYD G. GREENHAM

CONTENTS

INSTRUCTIONAL CONTENTS

The program on Map Reading Skills: Latitude and Longitude consists of the following materials:

Slides
Audio Cassette Tapes
Audio Script
Student Booklet
Teacher's Guide

INTRODUCTION

The unit Map Reading Skills: Latitude and Longitude has been designed to help the low-achieving student entering the mainstream of junior high school who is supposed to have mastered the skills at an earlier age and grade.

The kit provides for individual differences in that each student can use the kit at any time and at his own pace.

Once the introduction is given by the teacher, the kit is designed so that the pupil may proceed independently. Self-teaching enables the teacher to provide the best possible learning environment for the pupils and at the same time be free to work with individual pupils on specific problems.

SOME BASIC PREMISES

1. It should be understood that this program is only suggestive of the kinds of experiences which may be introduced to the slow-learner by the teacher.

2. Map reading may evolve as a discrete entity or be assimilated into other facets of the social studies program. In short, the program is adaptive.

3. The program illustrates selected fundamental aspects of latitude and longitude at a very low level of comprehension. The program is by no means all-inclusive; a thorough understanding of these concepts, however, should permit the low-achieving student to venture further in related topics for independent or group study.

4. Although the slide-tape program is an adequate teaching tool per se, its value can be further enhanced in combination with other media--maps, globes, atlases, models, and class activities.

THE INTENDED LEARNER

The following assumptions are made concerning the individual who will undertake to do Map Reading Skills: Latitude and Longitude.

1. The learner has a reading comprehension of at least grade three or four.

2. The learner will have an unsatisfactory score on Test A (less than 70%) which accompanies Map Reading Skills: Latitude and Longitude.

3. Learners know the four cardinal directions (North, East, West, South) and know that North is at the top of a globe or map unless otherwise indicated.

4. Learners may or may not have been exposed to a study of latitude and longitude, but forgetting has taken place.

PURPOSE

The main purpose of this unit is to introduce the student to the basic mapping concepts of latitude and longitude and to promote these ideas as essential prerequisites to the effective use of maps and globes.

Other purposes are to develop the following understandings:

- The equator divides the world into two equal parts -- North and South.
- The Prime Meridian (and International Date Line) divide the world into two equal parts — East and West.
- Lines of latitude are imaginary lines that circle the earth parallel to the equator.

- The meridians of longitude are imaginary lines that run north and south and converge at the poles.

- Latitude is used to measure north and south of the equator and is 0° at the equator and 90° at the poles.

- Longitude is used to measure east and west. The Prime Meridian is 0° and the lines of longitude run 180° West and 180° East.

FITTING THE KIT INTO A SOCIAL STUDIES PROGRAM

Because it is an independent program of skill development, there should be no problem integrating it into the overall junior high school social studies program for the low-achieving student. The kit can be used at any time for teaching, expanding, reinforcing, or reviewing map skills. The nature of the slides allows them to be used out of sequence for further purposes.

INSTRUCTIONS FOR ADMINISTERING THE PROGRAM

An introductory talk by the teacher indicating the nature of the program and how to use it will be helpful if this form of instruction is new to the students. The teacher may read the instructions aloud to the students or the students may read the instructions independently and begin Part I of the program. The teacher should be available for individual questions and problems and to see that the student is familiar with the procedures for using the slide-tape program.

A day or two before the teacher decides to use the program, the whole kit should be placed before the class. The teacher should point out the title and ask students concerning previous knowledge about maps in general. He should discuss the importance of maps and

map skills by emphasizing that maps can be used in everyday life and can help increase understanding of geography and history as well as other subjects.

Select a student booklet, some slides, and a tape and explain that the slides and tape are used simultaneously and in conjunction with the booklet. Explain that students will have to listen carefully to the tapes and follow the instructions very carefully. Try to make the student or students feel at ease by emphasizing that the process is very simple.

The teacher may need to show how the slides and tape work by bringing to class a slide projector and a cassette recorder. This will help ensure that the student encounters the minimum of difficulty when he comes to use the kit.

If manual equipment is to be used, explain that students are

to advance to the next slide only after hearing a "beeping" type of sound.* Failure to do this might mean that the student will have to rewind the tape and start again.

Allow time for discussion to make sure the basic ideas are clearly understood before pupils begin independent work.

---

*NOTE: Side two of each cassette contains the same program with 1 kHZ impulses that can be synchronized automatically by using the Sony TC - 182 Cassette-Corder and a Kodak slide projector. Connect the TC -182 slide synchronization connector to the Kodak slide projector (equipped with a 5-pin or 6-pin connector).

THE TEACHER'S ROLE

While the program is designed so that it is theoretically possible to turn a student loose in a learning resource center to educate himself, this is practically impossible, especially for the slow-learner, who will need considerable guidance while using the kit. Much more can be accomplished if the program is coupled with teacher guidance, demonstrations, and classroom discussions.

Besides, students will need to be reminded how to use the slide-tape program and how the required hardware operates.

RECOMMENDED TIME SCHEDULE CHART

Item	Approximate Time
Test A (pretest)	30 minutes
PART I - Latitude	15 minutes
PART II - Longitude	15 minutes
Test B (posttest)	30 minutes

OBJECTIVES

On completion of Map Reading Skills: Latitude and Longitude the learner will be able to demonstrate his comprehension of the basic factors of latitude and longitude and their relationships by performing and understanding the steps in working problems involving the use of latitude and longitude.

Specific Aims

The specific aims have been organized to show the sequential development of the concepts of latitude and longitude.

1. To review degree. The student will be able to:
   1.1 write the word degree in response to a definition asking for the word degree.

2. To review latitude. The student will be able to:

2.1 write the word latitude in reply to a definition asking for the word latitude.

2.2 write, without the aid of references, the word parallel, with one hundred percent accuracy.

2.3 locate places marked on a map and express their locations in terms of latitude.

2.4 state the number of kilometers that one degree of latitude equals.

2.5 distinguish between eastern and western hemispheres on a simple pictorial representation of a globe.

2.6 state the exact number of degrees of latitude at the north and south poles.

2.7 label which one of two diagrams shows the correct spacing of latitude lines.

2.8 identify, among three others, the correct method to be used to write the latitude of a particular place.

3. To review <u>longitude</u>. The student will be able to:

3.1 write the word longitude in reply to a definition asking for the word longitude.

3.2 name, with one hundred percent accuracy, the other term for longitude.

3.3 describe the location of a point on a simple pictorial representation of a globe, in terms of its degrees of longitude.

3.4 describe the location of a point on a simple pictorial representation of a globe in terms of its east or west longitude.

3.5 know that the prime meridian is the 0° starting line for measuring longitude.

3.6 name the place, with one hundred percent accuracy, through which the prime meridian passes and from which it gets its name.

3.7 state, with one hundred percent accuracy, the exact number of degrees of longitude in the eastern or western hemispheres.

3.8 write the correct method to be used to express the longitude co-ordinate of a point shown on a pictorial representation of a globe or a simple map.

3.9 write, given a simple map or pictorial representation of a globe with longitude lines, the longitude co-ordinates of two places.

4. To review grid. The student will be able to:

   4.1 name the term used to describe a combination of latitude and longitude lines on a map or globe.

5. To develop skill in reading latitude and longitude on maps and work with problems involving latitude and longitude. The student will be able to:

   5.1 recall and label, given a simple grid map, which are latitude lines and which are longitude lines.

   5.2 write the co-ordinates for dots placed on a world map containing latitude and longitude lines.

   5.3 choose the correct method to be used to express the latitude and longitude of a place from among three other choices.

5.4 choose, from among three other choices, the letter which expresses the correct location of a point on a simple grid map, when the latitude and longitude co-ordinates for that point are provided.

5.5 decide which one of four diagrams is the correct way to represent longitude lines as viewed from the north pole.

5.6 decide which one of three diagrams is the correct way to represent latitude and longitude lines on a globe.

Besides the specific objectives of the unit, there are also several opportunities where the following skills may be promoted:

- accurate spelling
- vocabulary building
- developing listening skills
- developing visual perception and association
- sequential memory
- discussion
- noting main ideas
- asking questions

TEACHER INFORMATION

1. Since the first system of circles for determining East-West location was used by the English, they chose a circle of meridian passing through England. This meridian is called the Prime Meridian and it passes through Greenwich, England.

2. In 1884, an international convention established the Prime Meridian as the geographic meridian passing through a fixed point in Greenwich, the former site of the Royal Greenwich Observatory.

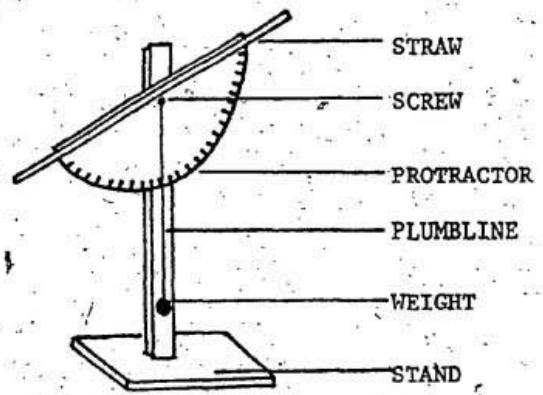
3. Since the earth is not a perfect sphere, one degree

of latitude varies from 110.8 kilometers near the equator to 111.9 kilometers near the poles. One degree of longitude is 96.8 kilometers at the equator and becomes 0 kilometers at the poles.

4. To determine location at sea or in the air a sextant is used. Calculations are made after sighting the horizon and another fixed object (star) to determine the exact location in degrees.

5. A simple instrument can be constructed by your pupils to determine latitude. Simply fix a drinking straw to the base line of a protractor with glue or tape. Hang a plumb line from the head of a screw holding the protractor to a simple wooden stand. This is to ensure

that the supporting pole is upright. Sight the North Star through the straw and read the angle on the protractor. This angle will be your latitude.



This diagram is adopted from the Instructo Teaching Guide, No. 851-5 - "Introducing Latitude and Longitude." Paoli, Pennsylvania: The Instructo Corporation, 1967.

SUGGESTED ACTIVITIES

The aim of the teacher's manual is not to dictate to the teacher how to implement the materials in the classroom. The teacher in the classroom is better aware of the needs of the students than is the developer of the unit.

As an aid to teachers in implementing the unit, the developer of the unit offers the following activities as either extra reinforcement or just for fun.

FIND THE HIDDEN WORDS

The first one has been done for you.

P N L X Y S L G U P A R A L L E L E P A G
S A X A Q T V L M R A U C T X R Y R I U R
V I O B T M I O R Z X N U F O J H K C O E
B D P Z H I T B L O N G I T U D E T T V E
T I R X N O T E U L M E A S T N O P U C R
O R F M A P T U T S K U M Z T F M N Q O I
R E S T U S W C D D Q L F O D E G R E E S
K M I C E K E R U E N O R T H F R U R K L
S L E W G R E E N W I C H D U Y I V L L S
X P R I M E M E R I D I A N C E D N X L V
Z I M U T L S Y H E M I S P H E R E T L A

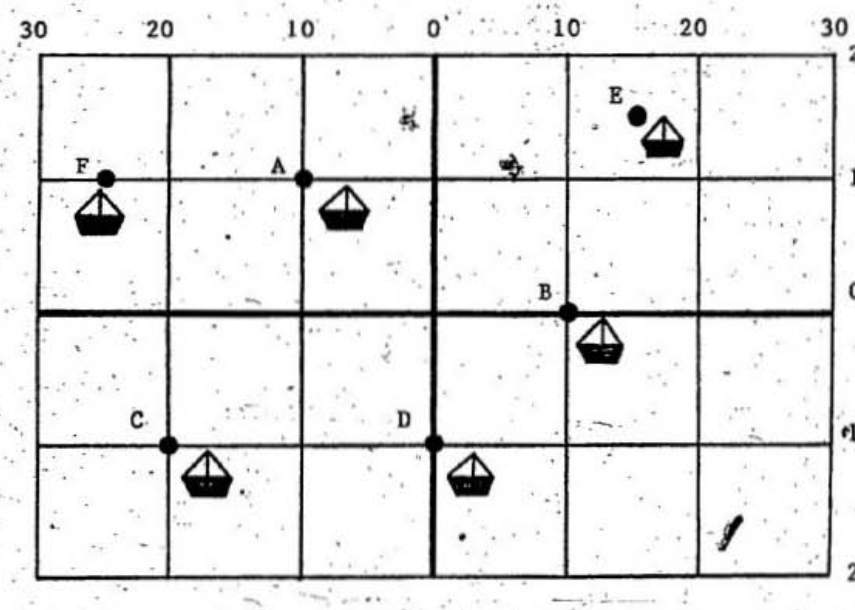
~~GREENWICH~~
LATITUDE
PARALLEL
EQUATOR
NORTH
SOUTH
LONGITUDE
MERIDIAN
PRIME MERIDIAN
EAST
WEST
HEMISPHERE
DEGREES
GRID
MAP
GLOBE

MATCHING

List A	List B
1. _____ Latitude	A. means the same as latitude
2. _____ Longitude	B. a combination of latitude and longitude lines.
3. _____ Parallel	C. the zero degree latitude line.
4. _____ Meridian	D. another name for longitude.
5. _____ Prime Meridian	E. the prime meridian passes through.
6. _____ Equator	F. imaginary lines on a map or globe which go from east to west.
7. _____ Degrees	G. half a globe.
8. _____ Grid	H. to divide into equal distances on a map or globe.
9. _____ Hemisphere	I. imaginary lines on a map or globe which go from the north pole to the south pole.
10. _____ Greenwich	J. the zero degree longitude line that extends from the north pole to the south pole.

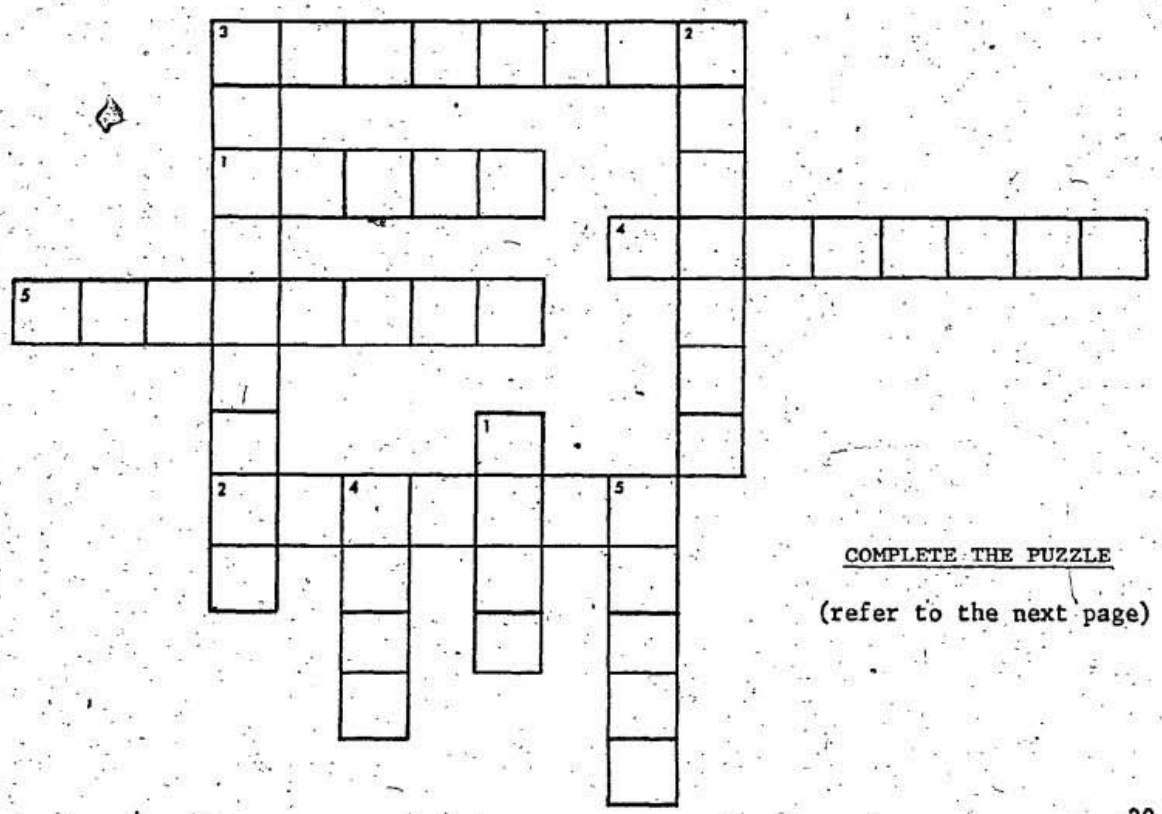
FIND THE SHIPS

Give the Latitude and Longitude of the ships located at the points shown. Place your answers in the spaces provided to the right of the map. The first one has been done for you.



	Lat.	Long.
A	10°N	10°W
B		
C		
D		
E		
F		

28



COMPLETE THE PUZZLE

(refer to the next page)

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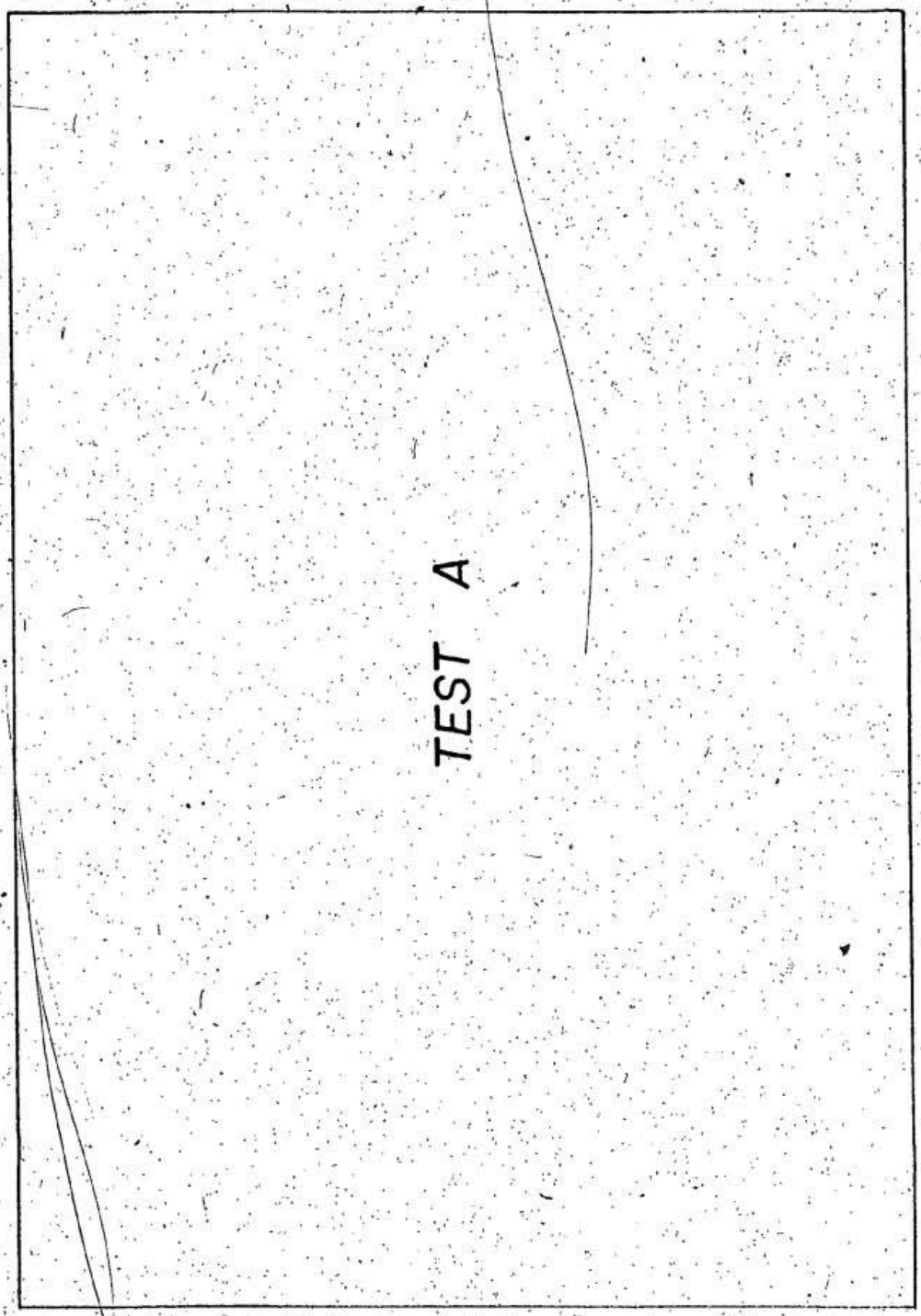
Down

1. Longitude lines measure East and _____.
2. The 0° line of latitude is the _____.
3. The Prime Meridian is a _____ line.
4. A combination of latitude and longitude lines on a map or globe is called a_____.
5. The opposite of North on a map or globe is _____.

Across

1. Canada is located in the _____ Hemisphere.
2. A unit of measurement on a map or globe is the _____.
3. _____ measures distances North or South of the equator,
4. Another name for latitude is _____.
5. Another name for longitude is _____.

APPENDIX* E


TEST A

TEST A (Pretest)

Test A is intended as a pretest. Students who score more than 70% on this test probably do not need to take the program. A diagnosis of the test results may indicate that only a portion of the program is needed. For example, some students may know Latitude (Part I) but are unable to work with problems involving Latitude and Longitude (Part II).

Students can take Test A in normal class time. The tests could be scored immediately in class.

DIRECTIONS FOR ADMINISTERING TEST A

Students should have a pencil and an eraser. Explain to students that the test will help them understand Latitude and Longitude.

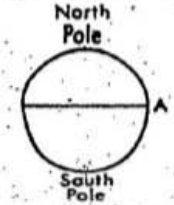
Allow approximately thirty minutes to complete. (Time can be a little flexible depending on the nature of the learners).

The teacher should help the students with any reading problems.

T E S T A

Name_____ Class_____ Date_____

Place the correct answer to each in the blanks provided.

1. 

On the diagram to your left, line A is called the

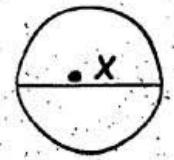
_____

2. The unit for measuring distance on a globe is the same as that used on a circle. It is called the

_____

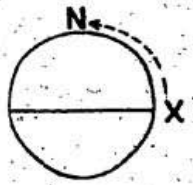
3. Latitude lines are imaginary lines on a map or globe which go from ? to ? .

_____

4. 

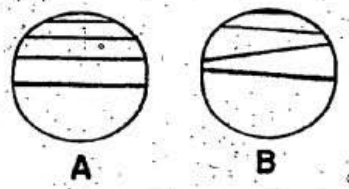
On the diagram to your left, point X is in the ? hemisphere.

_____

5. 

On the diagram to your left there are ? degrees from point X to the North Pole.

_____

6. 

Which one of the two diagrams to the left shows the correct way for spacing latitude lines?

_____

7. When we write 20° latitude, the ($^{\circ}$) means

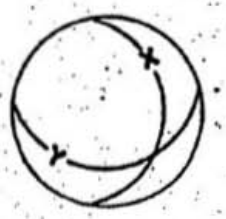
_____

8. A term which means the same as longitude is

_____

9. Longitude is measured from the 0° longitude line which is called the

_____

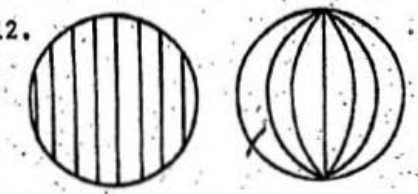
10. 

On the diagram to your left, line ? is a longitude line.

_____

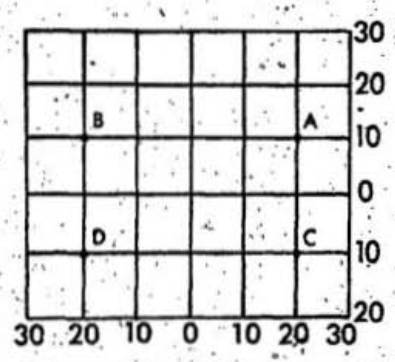
11. When we place latitude and longitude lines together on a globe or map, we have a pattern called a

_____

12. 

Which diagram on the left is the correct way of showing longitude lines on a globe?

_____



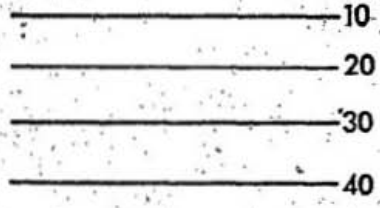
13. On the diagram to your left, which point is located at

Lat. 10° S; Long. 20° W.

_____

14. The prime meridian runs through what city located in England?

_____

15. 

In what hemisphere are the latitude lines on the left located?

_____

For the remaining questions, place the LETTER of the correct answer to each in the blanks provided on the right.

16. Another name for latitude is

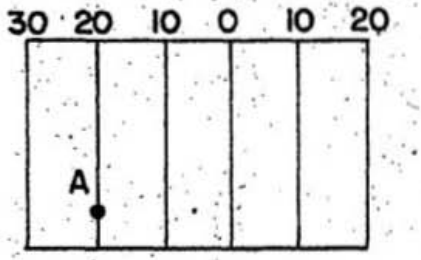
a. meridian
b. parallel
c. degree (____)

17. The number of degrees in either the eastern or western hemisphere of a globe is

a. 90
b. 180
c. 360 (____)

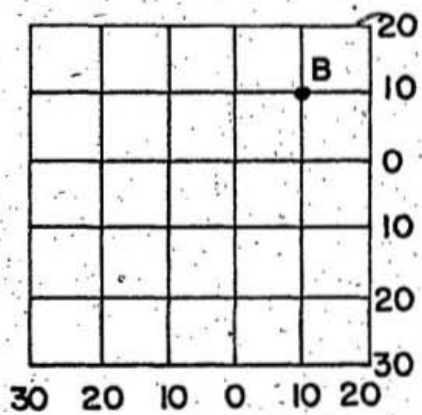
18. Which one of the following is the correct method for writing the latitude location of a place?

a. Lat. 20° N.
b. lati. 20° N.
c. Lat. 20° W. (____)



19. On the diagram to your left, the longitude of point A is written as

a. Long. 20°.
b. Long. 20° W.
c. Long. 20° N. (_____)

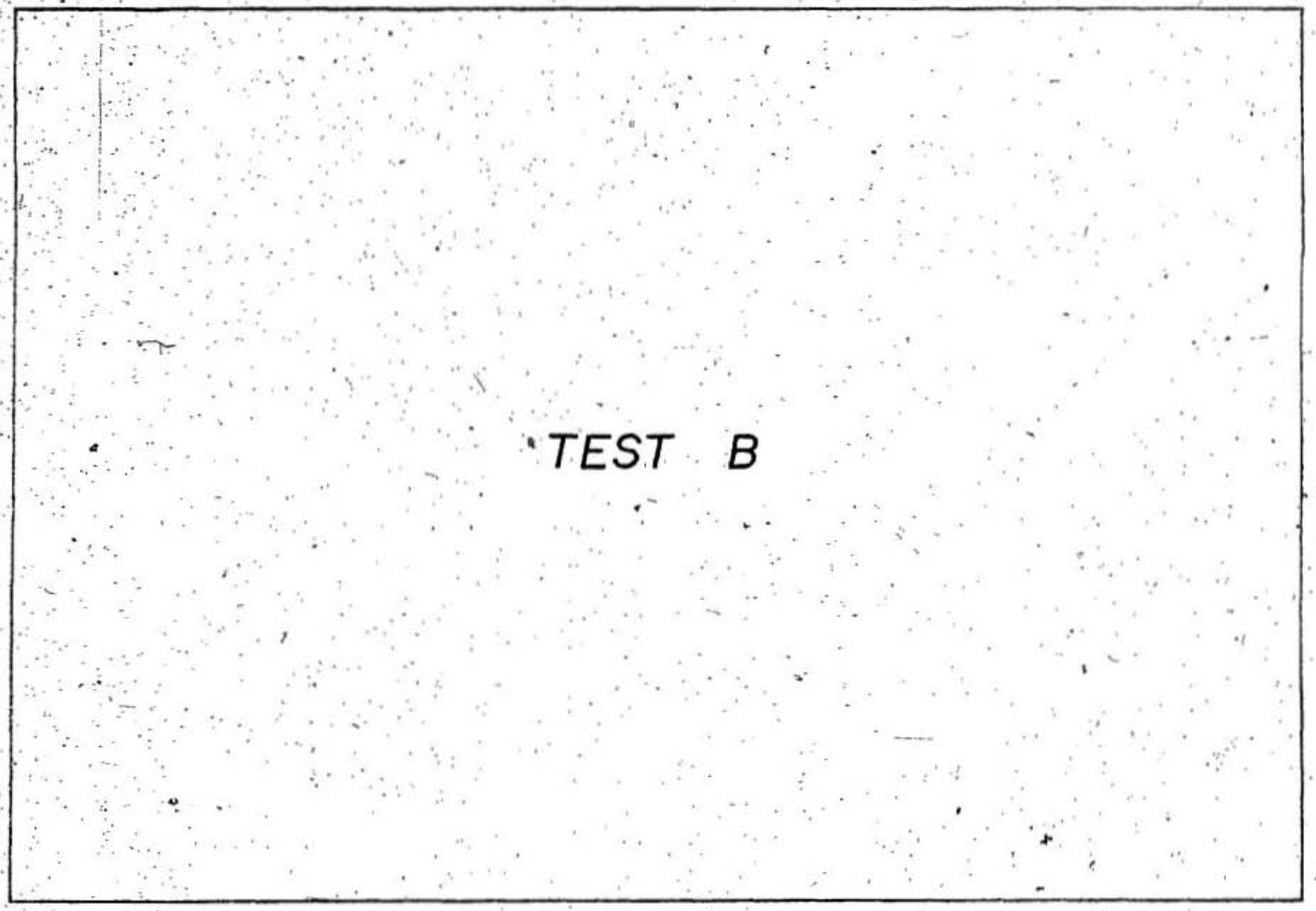


20. The correct location for point B on the diagram to your left would be shown as

a. Lat. 10° S; Long. 10° E.
b. Lat. 10° N; Long. 10° W.
c. Lat. 10° N; Long. 10° E. (_____)

KEY TO TEST A

1. Equator
2. Degree
3. East to West
4. Northern
5. 90
6. A
7. Degree
8. Meridian
9. Prime Meridian
10. X
11. Grid
12. B
13. D
14. Greenwich
15. Southern
16. b
17. b
18. a
19. b
20. c


TEST B

T E S T B (Posttest)

When students have completed the program, they are ready for the test. Test B is intended as a "final" test of the program on Map Reading Skills: Latitude and Longitude. Anyone who does not make a satisfactory score should review the program and take Test B over again.

Although Test B is somewhat more difficult than Test A, it contains basically the same material as the pretest.

After a lapse of approximately one month, Test B may be readministered in order to observe the amount of retention.

DIRECTIONS FOR ADMINISTERING TEST B

Materials needed by students include a pencil and an eraser.

Students should be reminded to read the instructions carefully. Answers must be filled in on the sheets provided. The test must be completed within thirty minutes. The teacher should help students with any reading difficulties encountered.

T E S T B

Name_____ Class_____ Date_____

Place the correct answer to each in the blanks provided.

1. The starting line for measuring latitude is called

_____

2. The unit for measuring distances on a map or globe is called the

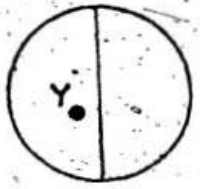
_____

3. Imaginary or make believe lines on a map or globe which go from east to west are called

_____

3. Imaginary or make believe lines on a map or globe for measuring locations north or south of the equator are called

_____

4. 

On the drawing to your left, point Y is in the (Eastern or Western) Hemisphere.

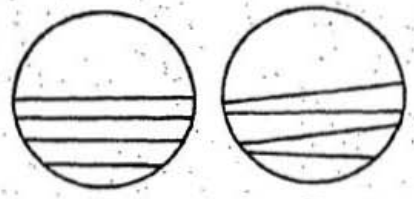
_____

5. The highest possible number of degrees of latitude is

_____

6. Latitude lines do not meet and are therefore often called

_____

7. 

Which one of the two diagrams on the left shows the correct way to draw latitude lines?

_____

8. Another name for longitude is

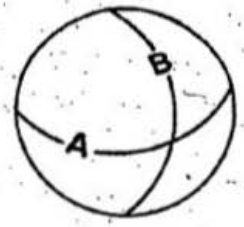
_____

9. The 0° starting line for measuring longitude is called the

_____

10. How many degrees of longitude are there in the eastern hemisphere?

_____

11. 

On the diagram to your left, which line is a latitude line?

_____

12. Latitude and longitude lines together on a map form a ___?___ which is useful for determining exact locations.

_____

13. Lines of longitude are closest together at the

_____

14. The starting line for measuring longitude runs through __?__ in England.

_____

15. 80° S is a line of longitude (TRUE or FALSE).

_____

16. One degree of latitude equals __?__ kilometers.

_____

17.

35

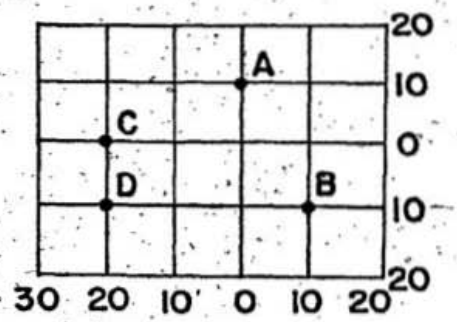
30

25

20

In which hemisphere are the latitude lines on the left located?

_____

18. 

In the diagram to your left, which point is located at Lat. 10° S; Long. 20° W. _____

For the remaining questions, place the LETTER of the correct answer to each in the blanks provided on the right.

19. Lines of longitude on a globe

a. are closest together at the equator.

b. run from north to south.

c. do not meet at the north pole. (_____)

20. Which one of the following is the correct longitude location of a place?

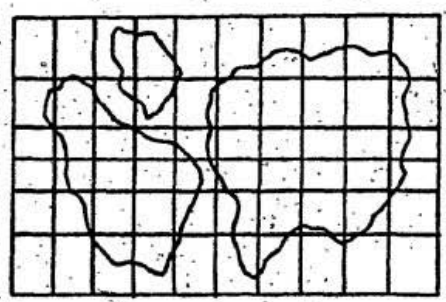
a. Longi. 20° S.
b. 20° E.
c. Long. 20° E. (_____)

21

Which one of the diagrams on the left is the correct way to show latitude and longitude lines on a globe?

a. diagram A.
b. diagram B.
c. diagram C. (_____)

22.



On the map to your left, the lines of latitude are

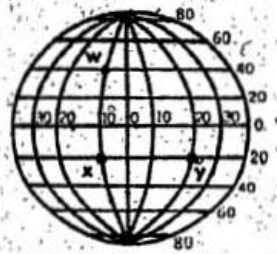
a. all the same distance apart.
b. straight lines.
c. joining the north pole and the south pole. (_____)

23. Which one of the following is a correct location

a. Lat. 40° W; Long. 70° N.

b. Lat. 30° S; Long. 120° E.

c. Lat. 180° N; Long. 20° W. (____)

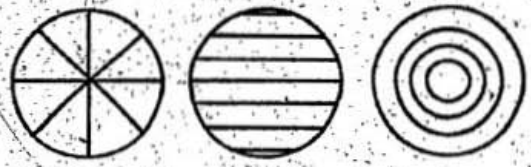
24. 

On the diagram to your left, Lat. 40° N; Long. 10° W describes

a. point W.

b. point X.

c. point Y. (____)

25. 

Which one of the diagrams on the left shows what longitude lines would look like from the north pole?

a. diagram A.

b. diagram B.

c. diagram C. (____)

KEY TO TEST B

1. Equator
2. Degree
3. Latitude
4. Western
5. 90
6. Parallels
7. Diagram A
8. Meridian
9. Prime Meridian
10. 180
11. A
12. Grid
13. Poles
14. Greenwich
15. False
16. 113
17. Northern
18. D
19. b
20. c
21. c
22. b
23. b
24. a
25. a

APPENDIX F

Figure 13

Experimental and Control Group Scores on Pretest.

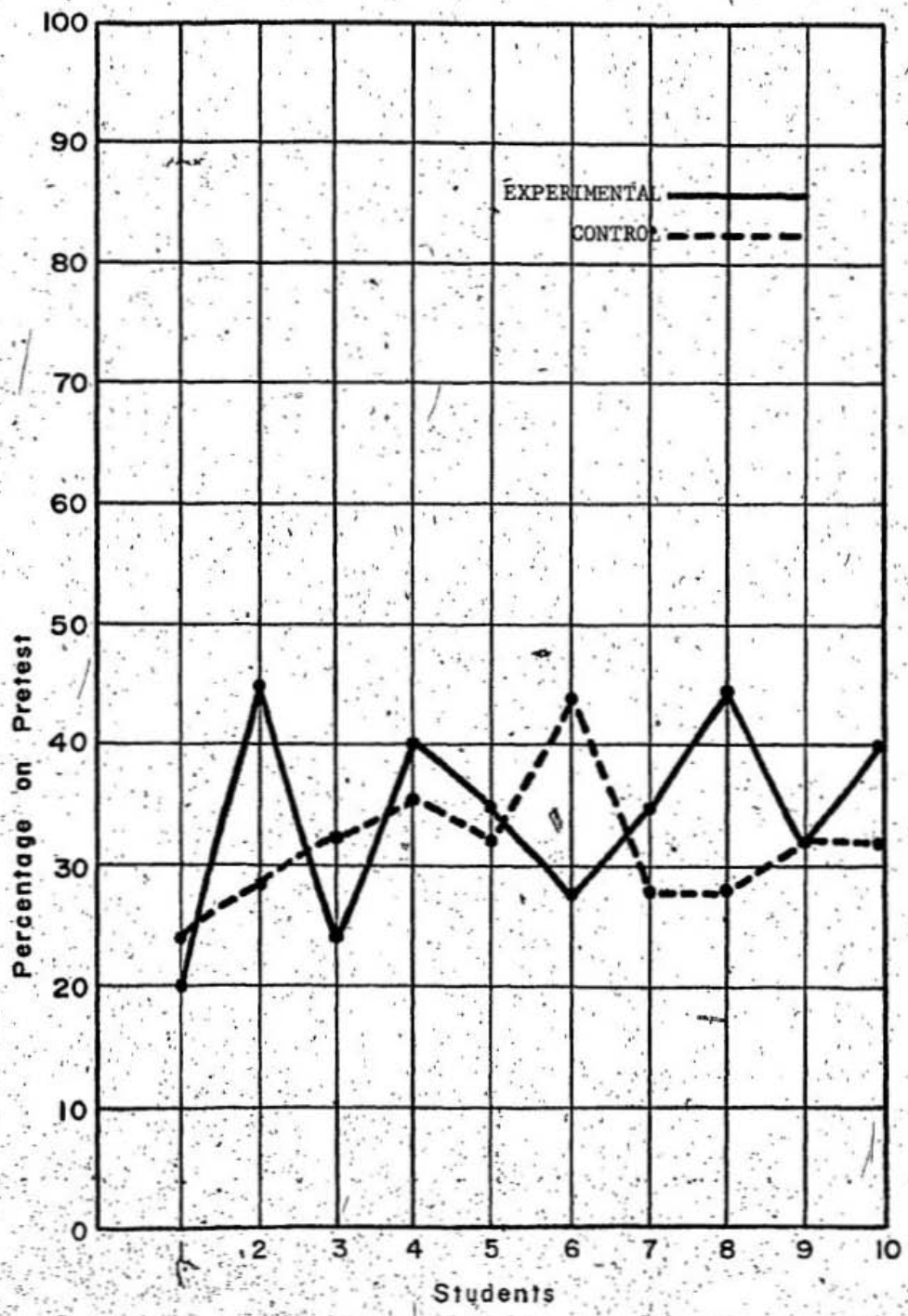


Figure 14

Experimental and Control Group Scores on Posttest.

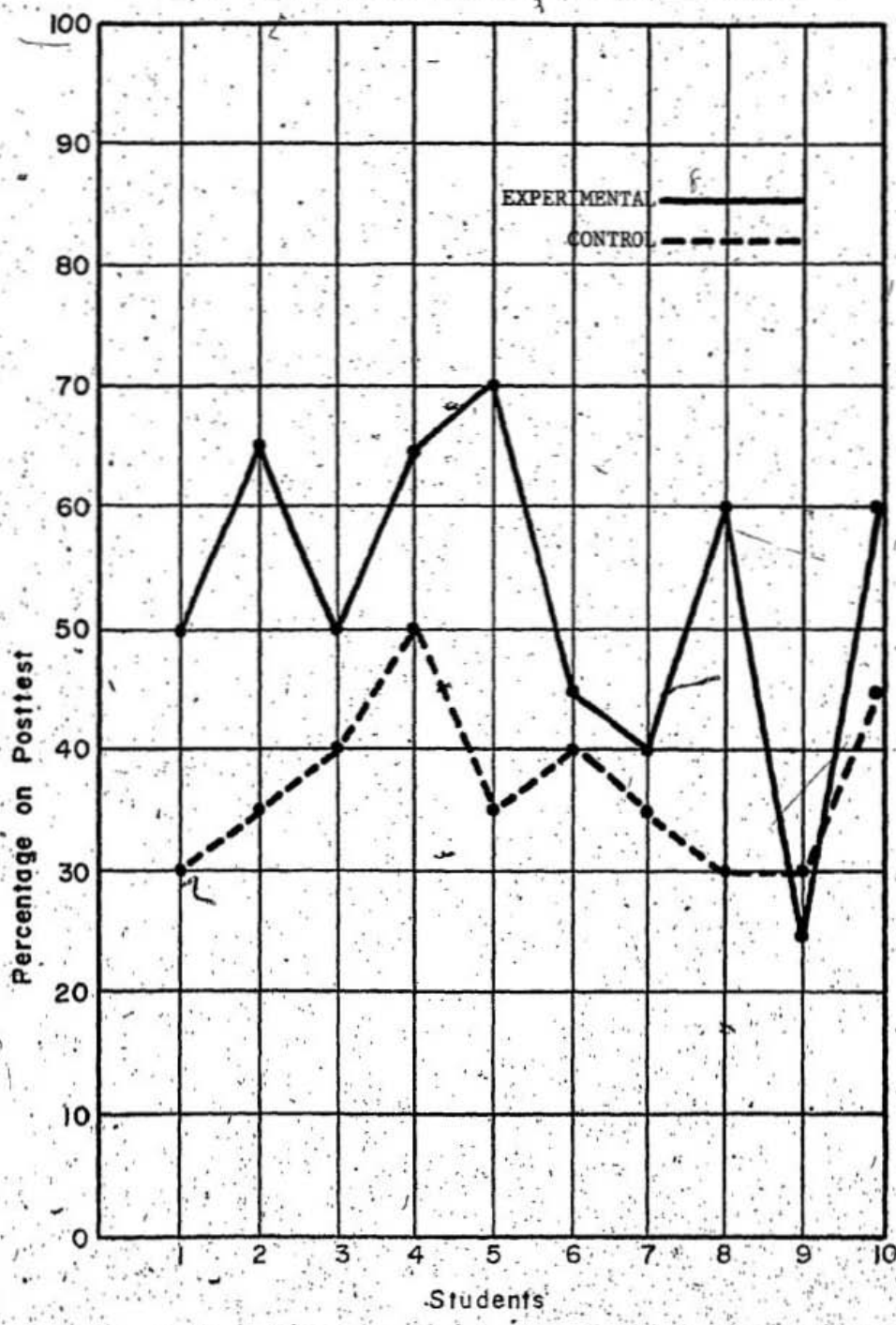


Figure 15

Experimental Group Scores on Pretest and Posttest.

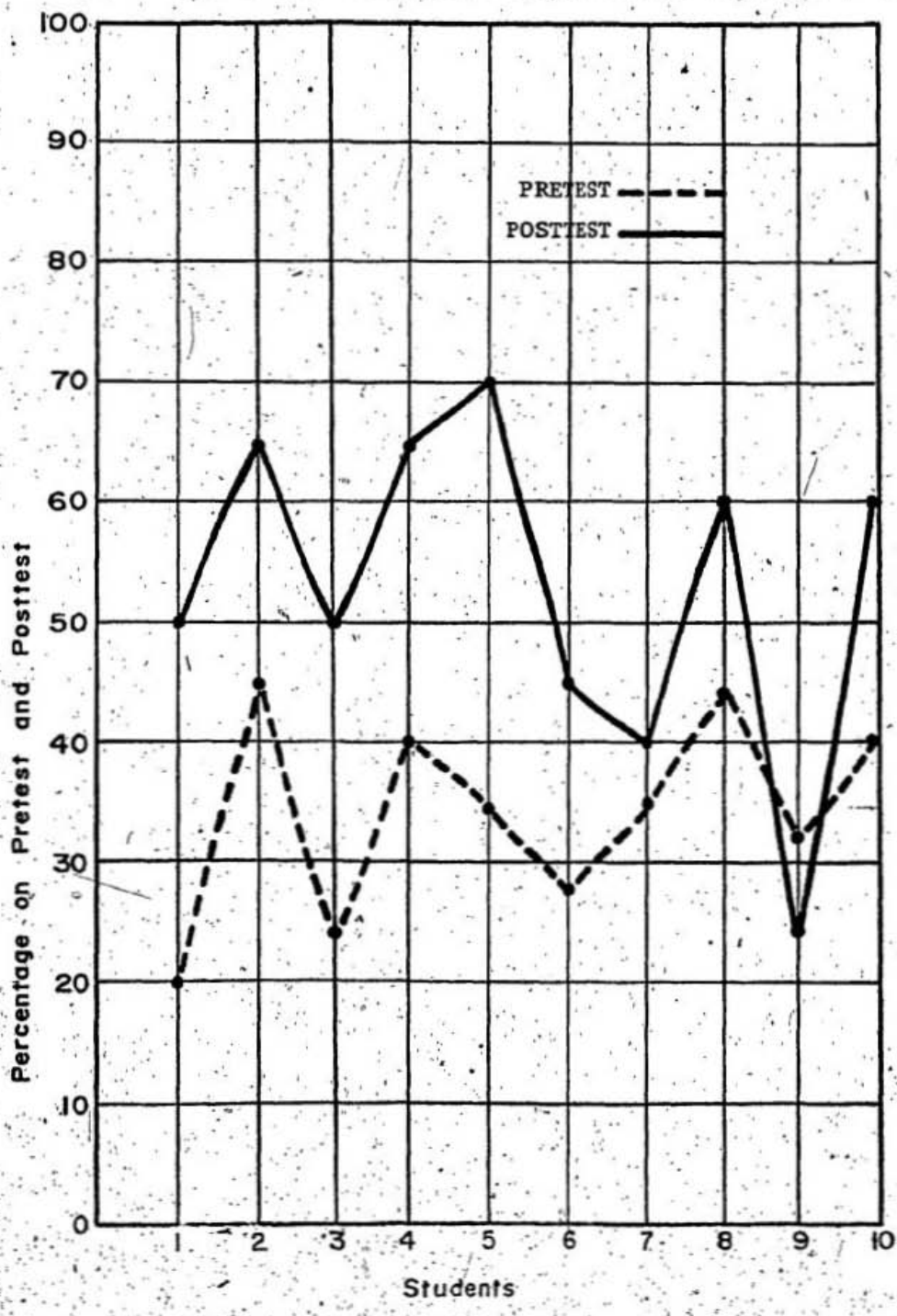


Figure 16

Control Group Scores on Pretest and Posttest.