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ABSTRACT

The performance of 272 elementary school aged educable retarded children was used in the final evaluation of the five unit Money, Measurement and Time program. Criterion referenced pre- and posttests were administered to assess the effectiveness of each unit, and A Cognitive Abilities Test evaluated Ss' general improvement in non-content-specific areas of functioning. Analysis of results indicated that the gains in the Money and Time with the Clock units were significant, while the gains on the Length and Measurement of Weight units were not as impressive. Item analyses of the unit tests demonstrated that Ss' learning went beyond the immediate instruction they had received. Data on nonretarded children's performance provided normative information. Results suggested revisions in specific content for each unit. (CL)

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AN ASSESSMENT OF THE EFFECTIVENESS OF THE MONEY, MEASUREMENT AND TIME PROGRAM FOR EMR CHILDREN

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Center in Education of Handicapped Children
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RESEARCH, DEVELOPMENT AND DEMONSTRATION CENTER IN EDUCATION OF HANDICAPPED CHILDREN

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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

Abstract

The present paper summarizes the activities undertaken by the Vocabulary Development Project during the 1973-74 EMR field-test of four units in the Money, Measurement and Time Program. Performance data related to each unit are reviewed here, and data related to the performances of nonretarded subjects on the unit tests, and to the performances of EMRs on the Cognitive Abilities Test are reported for the first time within this document. This paper concludes with several recommendations for revisions which should be made before the final publication of the materials.

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An Assessment of the Effectiveness of the Money, Measurement and Time Program for EMR Children

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The Money, Measurement and Time Program is an instructional program designed to provide young educationally handicapped learners with a basic understanding of the crucial areas of money, measurement, and time. The instruction in the Program was developed through the joint efforts of the University of Minnesota's Research, Development and Demonstration Center and the Special Education Department of the St. Paul Public Schools. The Program, developed over a period of three years, was designed primarily for children designated as "educable mentally retarded" (EMR). Much of the instruction, however, also appears to be appropriate for trainable mentally retarded children (cf. Nelson, Troup, Thurlow, Krus, & Turnure, 1975).

The Money, Measurement and Time Program consists of five units of instruction: 1) Money, 2) Measurement of Length, 3) Measurement of Weight, 4) Time with the Clock, and 5) Time with the Calendar. Each of the units is considered to be particularly valuable for mentally retarded children. These children need to develop practical skills (e.g., counting money, measuring length, telling time) as well as increase their vocabulary, but often do not have the reading or computational skills seen as prerequisite to such instruction. The belief underlying the Money, Measurement and Time Program is that retarded children can be given systematic instruction in such content

areas, even if they cannot read or add and subtract.

The instruction in the Money, Measurement and Time Program has its basis in findings from psychological research. It represents an attempt to realistically introduce basic learning strategies into classroom materials. The highly effective learning strategies of mental imagery and verbal elaboration (cf. Rohwer, 1973; Taylor, Josberger, & Knowlton, 1972; Thurlow & Turnure, 1972; Turnure & Thurlow, 1973a,b; Whitely & Taylor, 1973) are incorporated in the materials and reflected in the instructional techniques of definitions, elaborations, and relations. These instructional techniques are ones which were initially tested in the classroom, and their effectiveness verified (Taylor, Thurlow, & Turnure, 1974).

The approach of the Program is to stress the "growth of meaning" by developing simple, specific meanings first and then systematically elaborating (adding elements of meaning) to approach the full and commonly accepted meaning of a word. As the children obtain the necessary vocabulary foundations, related skills are introduced. In taking this approach, the Program attempts to enhance general language development and the development of effective learning strategies, as well as vocabulary development and skill development.

A Teacher's Introduction (Thurlow, Taylor, & Turnure, 1973) accompanies the instructional materials in the Money, Measurement and Time Program. It presents not only the guidelines for using the materials in the classroom, but also the rationale for the Program and the instructional techniques used. This Introduction is an excellent source for further information about the Money,

Measurement and Time Program.

The materials and techniques included in the Money, Measurement and Time Program are the result of an extensive development and evaluation process undertaken by the Vocabulary Development Project. The Project's four-stage development and evaluation plan involved a chain of activities which included: 1) the move from research to development, 2) the assessment of prototype materials, 3) the "formative" evaluation (pilot-testing of initial materials, and their subsequent revision), and finally, 4) the "summative evaluation" (a large-scale field-test of the revised materials comprising the Money, Measurement and Time Program). This overall process insured the feedback from classroom teachers, as well as data from evaluation instruments, contributed to the production of a useable and effective program for the EMR child. A description of the four-stage plan of the Vocabulary Development Project, and especially of the most extensive third stage (the "formative" evaluation), may be found in Krus, Thurlow, Turnure, Taylor, and Howe (1974).

The present paper summarizes the activities undertaken during the final stage of the Vocabulary Development Project's evaluation plan -- the stage of "summative" evaluation. According to Scriven (1967), "summative" evaluation refers to the assessment of a "final" instructional product in a field-test situation. The summative evaluation stage was implemented by the Vocabulary Development Project during the 1973-74 academic year and involved EMR classes from Minnesota. During the field-test of the units in the Money, Measurement and Time Program, interactions between Project personnel

and field-test participants were kept at a minimum so that a more valid evaluation of the units' effectiveness would be obtained. In addition, control groups were employed to test (a) the effectiveness of the Program in comparison to instruction provided by teachers not having the Program, and (b) the effectiveness of the Program in comparison to a similar new instructional program dealing with different content (i.e., a Hawthorne control).

The purpose of the field-test described here was to assess the useability and effectiveness of four of the units in the Money, Measurement and Time Program and to identify any areas where further revisions might be needed. The four units tested were: 1) Money, 2) Measurement of Length, 3) Measurement of Weight, and 4) Time with the Clock. This paper summarizes the results of the field-test, and recommends revisions which might be undertaken before commercial publication of the materials. The fifth unit in the Program (Time with the Calendar) was developed later than the other units and underwent formative evaluation (pilot testing and revision) during the period when the other units were undergoing summative evaluation. The description of the results of the Time with the Calendar Unit may be found in Thurlow, Howe, Krus, Taylor, & Turnure (1975).

Method

Design

An ideal field-test plan, in which classes would be allowed to spend the entire 1973-74 academic year progressing through the

instruction in one unit from the Money, Measurement and Time Program, could not be implemented due to budget and time restrictions. Therefore, the field-test was designed so that the Money and Time with the Clock Units were tested in one set of classes, and the Measurement of Length and Measurement of Weight Units in another set of classes. Classes that began instruction in the Money Unit in the fall were switched to the Time with the Clock Unit in early spring. Similarly, classes that began instruction in the Measurement of Length Unit in the fall were switched to the instruction in the Measurement of Weight Unit.*

Two factors (treatment and community) were investigated in the summative evaluation of each of the units in the field-test. The major factor of interest was the instructional treatment factor. The three treatment groups in the design were: 1) Experimental, 2) Hawthorne, and 3) Control.

The Experimental group consisted of those classes receiving the unit being evaluated. Thus, in the field-test of the Money Unit, the group of children receiving the Money instruction was referred to as the Experimental group.

The Hawthorne group for the field-test of a particular unit was comprised of classes receiving instruction in a different unit in the Program. For example, the Hawthorne group in the Money field-

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* It should also be noted, however, that a few classes in the Money and Length Units were allowed to continue instruction in one unit from fall through to the end of the year so that all instruction could be tested. Those classes that did not switch to a new unit were replaced so that an adequate number of children would receive the Time with the Clock and Weight Units.

test consisted of the classes receiving the Measurement of Length Unit. The Hawthorne group in the field-test of the Measurement of the Weight Unit consisted of the classes in the Time with the Clock Unit. The Hawthorne groups constituted an important type of control during the summative evaluation of each unit. The classes in this condition served to control for the often found performance increases resulting from the "novelty" of a new program in the classroom (cf. Roethlisberger & Dickson, 1950), interactions with testers, learning-to-learn, and several other factors. To conclude that the instruction in any one unit contributed significantly to performance increases, the results must show that the Experimental group performed significantly better than the Hawthorne group.

The Control group consisted of classes where teachers were left on their own, either to teach or not to teach the content areas being field-tested. When these teachers chose to teach one or more of the areas, they were allowed to use any materials available to them (e.g., published materials, teacher-developed materials, etc.), except the materials from the Money, Measurement and Time Program. All Control teachers were informed that their children were being tested on money, length, weight, and time.

The second factor in the design was that of community location (urban, rural, or suburban). The categorization of communities as urban, rural, or suburban concurred with the categorization scheme of the Minnesota Department of Education. Urban communities included three major cities in Minnesota. Suburban communities were ones which immediately adjoined these cities. Rural communities included

those not covered by the above classification systems.*

Materials

The materials employed in the present field-test were those included with each unit of the Money, Measurement and Time Program. For each book of instruction in each of the units, the classes were given 1) teacher's edition, 2) student texts, 3) audio tapes, 4) worksheets and transparencies, and 5) other relevant teaching materials (money puzzle cards, balance scale, etc.). These materials are described in detail in the Teacher's Introduction (Thurlow, Taylor, & Turnure, 1973, pp. 8-11).

The content of each unit reflected the revision of the pilot-test materials. Each unit was designed to present vocabulary words in a manner which would promote an understanding of key concepts in the content area, and the development of related skills. Appendix 1 presents an overview of the general content and flow of each unit used in the field-test, as well as the selected vocabulary and the breakdown of the books of instruction in each unit.

Subjects

The population employed for field-testing during the summative evaluation was elememtary school-aged educable mentally retarded

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* The rural communities in the present field-test, however, might be considered somewhat aytpical. For example, one rural community contained two small colleges, another contained one. Also, academic and professional people lived in some of the "rural" communities and commuted daily to work in a nearby urban community.

children. Overall, there were 29 classes involved in the field-test. Twenty-one of the classes (9 urban, 6 rural, and 6 suburban) received the experimental materials. The other eight (3 urban, 2 rural, and 3 suburban) were in the traditional Control group.

The overall IQ, mental age (MA), and chronological age (CA) data for the children in the field-test are presented in Table 1. The average IQ was 71.1, and average MAs and CAs, in years, were 6.2 and 8.5, respectively. These data are for the entire population and, of course, do not reflect the specific population characteristics of the children in the field-test of any particular unit.

Tests

Criterion-referenced tests were used to assess the effectiveness of each unit. Each test was developed directly from the behavioral objectives of the target unit, with some tests stressing the expressive components of a unit, and others stressing the skills components. Each test was administered as both a pretest and a posttest, and in some cases, was also used to test for retention. Table 2 presents a general description of the criterion-referenced test(s) used for each unit. Specific items in the test(s) for each unit will be identified in the results section (see Tables 5, 9, 13, and 15).

A Cognitive Abilities Test (Thorndike, Hagen, & Lorge, 1968) was administered to 16 of the classes entering the field-test in the fall of 1973. These same classes were also posttested on the Cognitive Abilities Test (CAT) at the end of the school year. The CAT Test was employed to evaluate the children's general improvement in non-

Table 1

Overall IQ, MA, and CA Data for Subjects in the Field-test of the Money, Measurement and Time Program*

IQ

$\bar{X}$	=	71.07
SD	=	9.58
Range	=	47-93
n	=	242

MA (months)

$\bar{X}$	=	73.87
SD	=	14.36
Range	=	40-118
n		242

CA (months)

$\bar{X}$	=	102.32
SD	=	19.32
Range	=	63-145
n	=	272

* Numbers vary because IQ data were not available for all children in the field-test.

Table 2

Description of the Criterion-Referenced Test(s) for Each Unit

MONEY

Money Expressive Test

The Money Expressive Test was a twenty item test designed primarily to evaluate the child's ability to utilize specific vocabulary words. It consisted of four subtests which corresponded to the four instructional books of the Money Unit.

Money Skills Test

The Money Skills Test was a twenty item test designed to determine the child's functional understanding of money and money skills. It consisted of five subtests which evaluated skills ranging from simple recognition to counting money.

MEASUREMENT OF LENGTH

Length Expressive Test

The Length Expressive Test was a fourteen item test designed primarily to evaluate the child's ability to utilize specific length vocabulary words. It consisted of three subtests which corresponded to the three instructional books of the Measurement of Length Unit.

Length Skills Test

The Length Skills Test was a thirteen item test designed to determine the child's functional understanding of the comparatives of length and measuring skills. It consisted of three subtests which evaluated skills ranging from the comparatives to actual measurement.

MEASUREMENT OF WEIGHT

Weight Expressive Test

The Weight Expressive Test was a fourteen item test designed primarily to evaluate the child's ability to utilize specific weight vocabulary words. It consisted of three subtests which corresponded to the major points of entry into the instruction.

Weight Skills Test

The Weight Skills Test was a thirteen item test designed to determine the child's functional understanding of weight and weighing skills. It consisted of three subtests which evaluated skills ranging from the comparatives to actual measuring.

TIME WITH THE CLOCK

The Time Test was a thirty item test that consisted of three subtests. These subtests corresponded to the vocabulary and skills developed in the four books of instruction.

content specific areas of cognitive functioning after a full year of instruction in the Money, Measurement and Time Program.

Procedure

The field-test of the four units was conducted over a period of six months. The goal of the field-test was to assess each unit under relatively "normal" classroom conditions, with minimal interaction between Project personnel and field-test participants.

Before instruction was started, children in each class were pretested on the relevant tests. When the results of these tests had been summarized, they were used to determine the placement of each Experimental class in the instruction, as well as to provide a pretest measure for the evaluation.

All Experimental field-test teachers attended an inservice training session before instruction began. The purpose of this session was to introduce them to the Money, Measurement and Time Program, to acquaint them with the field-test plan, and to familiarize them with the Unit they would be using. Interactions with the classes stopped at this point (except for "Comment Cards" returned to Project Directors when the teachers felt comments were necessary), until posttesting time. In the spring, when classes were switched from one unit to a second unit (e.g., Money to Time), a written introduction, without a training session, was felt to adequately prepare the teachers for the unit. The purpose of this document was to review the Money, Measurement and Time Program, the field-test plan, and to completely familiarize the teachers with the new unit.

After instruction ended, classes were posttested on the unit tests. At the conclusion of each unit, Experimental teachers were requested to complete a detailed questionnaire on their reactions to the Unit, and to the Program in general. Control teachers were also asked to describe any instruction related to money, length, weight, and time that they had used during the 1973-74 year.*

During the last month of the field-test, nearly 300 nonretarded children were tested on each of the unit tests. Samples were taken from kindergarten, first-grade, second-grade, and third-grade classes from urban and suburban population areas. The purpose of such testing was to obtain "average" or "normative" performance data with which to compare the performances of children participating in the present field-test.

Results

A massive amount of data was collected during the 1973-74 field-test of the Money, Measurement and Time Program. All data, except those relating to the nonretarded subjects and the Cognitive Abilities Test have been presented, in detail, in a series of technical reports (Krus, Thurlow, Turnure, and Taylor, 1974 a,b,c,d). The data presented in those reports will only briefly be summarized here. The data from the nonretarded subjects on the unit tests, and the EMRs on the Cognitive Abilities Test will be presented here for the first time.

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* All Control teachers indicated that they taught two or more of the the areas being field-tested. Specific descriptions of the number of teachers presenting each area and the amount of time devoted to instruction can be found in the summative evaluation of each unit (Krus, Thurlow, Turnure, & Taylor, 1974a,b,c,d).

Money Unit

The field test of the Money Unit took place from the fall of 1973 to the spring of 1974. There were 210 children involved in the field-test, with 71 in the Experimental group, 69 in the Hawthorne group, and 70 in the Control group.

The pretest and posttest data on the Money Expressive and Money Skills Tests are presented in Tables 3 and 4. (It should be noted that these data reflect the performances of only those children receiving both the pretest and the posttest.) The results are presented graphically in the figures accompanying each table.

The change in performance levels on the Money Expressive Test is quite impressive for the Experimental group (see Figure 1). Although the Experimental group had a pretest performance level which was above that of the other two groups (only slightly above the Control group), the 5.24 point change from pretest to posttest was most dramatic for the Experimental group. Only the increase made by the Experimental group was found to be statistically significant ($p < .001$).

The mean performance levels on the Money Skills Test clearly demonstrate the effectiveness of the Money Unit instruction for the defined skills (see Table 4 and Figure 2). While the Experimental children started at a pretest level slightly higher than the Hawthorne group and at a level comparable to the Control group, their posttest level was far above the other two groups. The slope of the line representing the change from pretest to posttest is clearly most impressive for the Experimental group. Additional effectiveness

Table 3

Pretest to Posttest Scores of Subjects

Receiving both Pre and Post Money Expressive Test

Money Expressive Performances

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	9.09	14.33	4.60	5.70	8.42	9.83
Standard Deviation	3.92	3.39	4.81	4.30	5.37	5.62
n	33	33	10	10	24	24

Figure 1

Mean Number Correct on Money Expressive Test

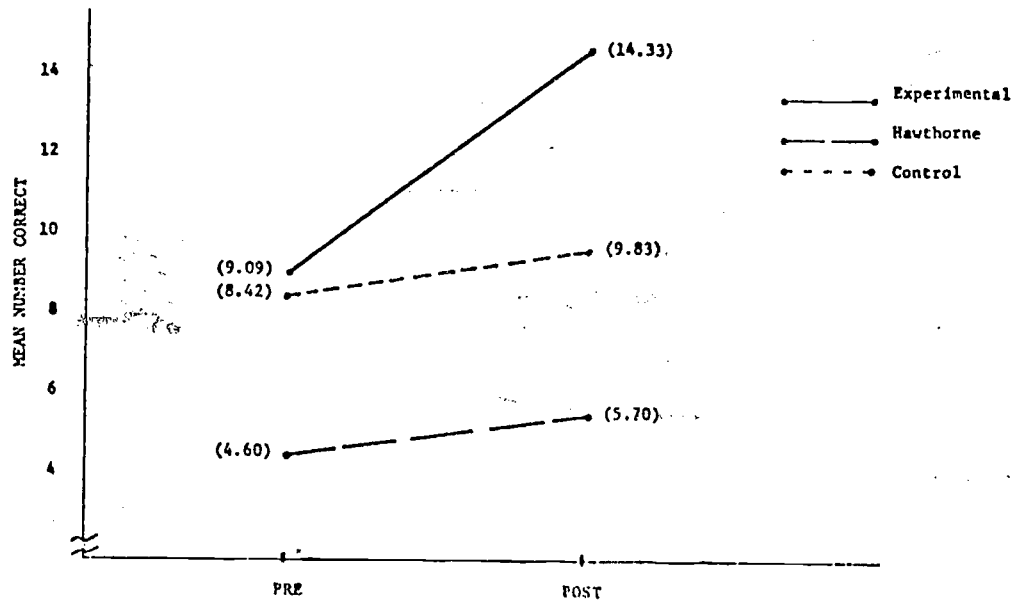


Table 4

Pretest to Posttest Scores of Subjects

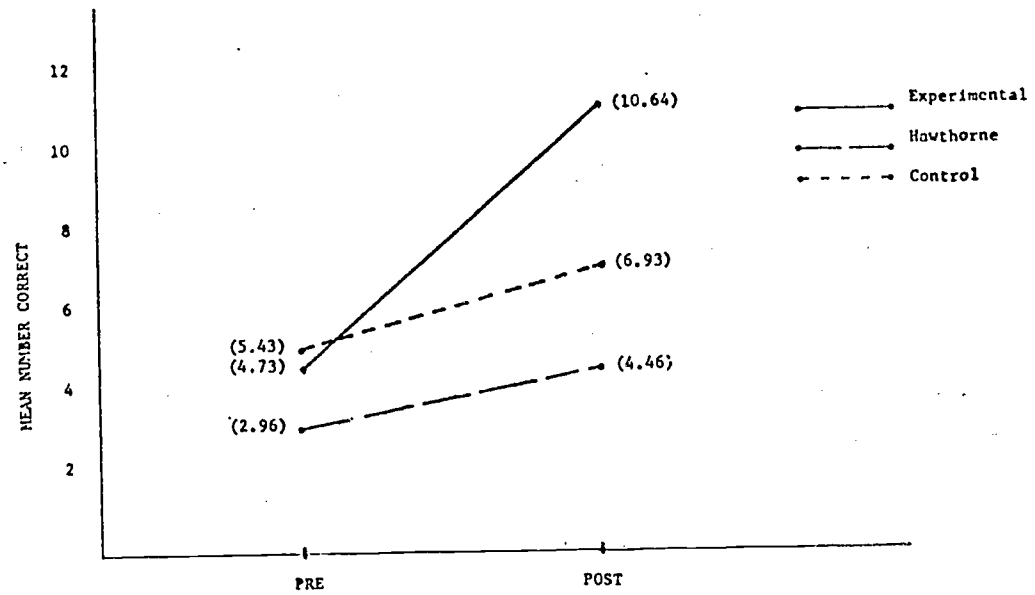
Receiving both Pre and Post Money Skills Test

Money Skills Performances

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	4.73	10.64	2.96	4.46	5.43	6.93
Standard Deviation	4.66	4.99	4.37	5.62	5.74	6.45
n	64	64	24	24	28	28

Figure 2

Mean Number Correct on Money Skills Test



data and the results of statistical tests on the data for both the Expressive and Skills Tests can be found in the summative evaluation report for the Money Unit (Krus, Thurlow, Turnure & Taylor, 1974a).

Table 5 presents the performances of the Experimental, Hawthorne, and Control groups by items on the Money tests. In this table, the items from the Skills and Expressive Tests have been integrated and ordered according to the sequencing of the instruction in the Unit.

Inspection of this table reveals that on 39 of the 40 items, the Experimental group performed better than both the Hawthorne and Control groups. On nearly all items, this superiority was statistically significant. The superiority covers a range of item types — those dealing with general money concepts (e.g., "Describes a trading situation"), those dealing with the recognition of money (e.g., "Selects picture of half dollar"), those dealing with relative value (e.g., "Orders 5 coins by value"), and those dealing with exact value (e.g., "States quarter is 25 cents"). The table of individual Money Test items clearly indicates that the Experimentals receiving the instruction in the Money Unit demonstrated the expected superiority over those not receiving the instruction.

Further inspection of Table 5, however, indicates that on some items, the subjects in the Experimental group receiving the instruction did not perform at a level statistically higher than the other two groups. This is true of the items, for instance, where the children were required to "select picturesof money," to "label a shopper as a customer," and to "respond 'change' to definition." In each

Table 5

Per Cent Responding Correctly in Each Group on

Individual Money Test Items

	Experimentals Receiving Instruction	Hawthornes	Controls
Describes trading situation	90	42	48
States "money" when related to store	84	71	74
Selects pictures of money	34	10	26
States "save" in response to definition	71	42	64
Labels a nickel	88	62	71
States "penny" in response to definition	96	52	64
States "dime" in response to definition	81	35	58
Selects dime as coin that buys most	68	31	42
Selects pictures of half dollar	94	38	68
Names more than 3 coins	88	39	64
Orders 5 coins by value	61	28	35
Selects coins buying more than nickel	51	24	39
Describes why fake bill not real	74	52	61
States "bill" labeling 20 dollar	89	61	64
Selects picture of 5 dollar bill	94	45	77
States "fifty dollar bill"	82	41	74
Labels shopper as "customer"	27	0	3
Labels a cash register	80	32	42
Describes relative value of quarter	79	48	77
States penny is "one cent"	85	41	55
Reads 5¢	85	61	71
Changes nickel for 5 pennies	59	24	32
Responds "change" to definition	29	3	13
States "dime" is 10 pennies	71	24	39
States "quarter" is "25 cents"	61	21	29
States "50 pennies in half dollar"	56	14	26
States "50 cent piece"	54	16	32
States dollar is "100 cents"	58	17	29
Reads $2	69	29	48
Reads $2.30	67	22	45
States 10 dollar bill = 2 fives	29	21	26
Counts 5 nickels	58	21	26
Counts combinations of coins (20¢)	42	24	39
Counts bills and coins (2.32)	29	10	16
Counts $1 bill and coins ($2.35)	22	10	19
Labels price tag	56	13	19
States that cash is money	78	58	55
Labels "check"	81	48	52
States "change" to definition	44	10	26
Makes change 12¢ from quarter	4	14	29

of these cases, the item was a low-level one, and the low performances across groups (23%, 10%, 15%) suggested that the test item was inappropriate for assessing the desired behavior. Toward the bottom of the table the increasing frequency of low scores across groups indicated that the objectives being tested were difficult ones. The implication that the Money Unit did not do an adequate job of presenting instruction, or the opportunity for practice, related to counting money and to change-making is evident in the results for these items. Such an item analysis suggests that revisions should be made in the instruction.

In the field-test version, the Money Unit concluded with a lesson on making change. However, the instruction dealt only with making change from a nickel. Procedures for presenting instruction on making change from other coins, and from bills, were available in additional lessons which were undergoing pilot-testing. However, none of the field-test classes had advanced to this instruction. This lack of instruction explains the finding that the one item on which the Experimentals scored lower than both of the other two groups required the children to make change from a quarter.

Table 6 presents the retention data for the Money Skills and Expressive Tests. These data were collected approximately two months after children were no longer receiving instruction in the Money Unit. The purpose of this testing was to assess the relative "permanency" of the increases observed from the instruction in the Money Unit. The results clearly indicate that the Experimental children had not forgotten what they had learned about money. Rather,

Table 6

Money Skills and Expressive Test Scores for Experimental Subjects at Posttesting and Two Months Later (Retention)

	Posttest	Retention
Money Expressive Test (20 items)		
$\bar{X}$	13.4	14.6
SD	4.0	3.3
n	70	46
Money Skills Test (20 items)		
$\bar{X}$	10.6	11.2
SD	4.9	5.2
n	70	46

the children had retained mastery of the concepts they had learned two months before. The slight increases in the scores at the time of retention testing were not significant.

Measurement of Length Unit

The field-test of the Measurement of Length Unit also took place from the fall of 1973 to the spring of 1974. There were 218 children involved in this field-test, with 70 children in the Experimental group, 76 in the Hawthorne group, and 72 in the Control group.

Table 7 and Figure 3 present the pretest to posttest data for children both pretested and posttested on the Length Expressive Test. On this test, both the Experimental and Control groups showed significant increases from pretest to posttest ($ps < .01$). The increases, however, were clearly largest for the Experimental group. This group started at a level lower than the other two groups and yet progressed to a level higher than the other two groups.

Table 8 presents the pretest to posttest data from the Length Skills Test. These data and their depiction in Figure 4 reveal that the Experimental group started at a lower performance level than either of the other two groups, and progressed to a level second only to the Control group, the group which had the highest pretest scores. The gains made by all three groups, however, were statistically significant. Clearly, the gains made by the Experimentals on the Length Skills test are not as impressive as those made by the Experimentals on the Money Skills Test. Additional effectiveness

Table 7

Pretest to Posttest Scores of Subjects Receiving

both Pre and Post Length Expressive Test

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	3.45	6.39	4.92	4.83	3.78	5.43
Standard Deviation	2.67	3.12	2.06	2.72	2.15	2.33
n	31	31	12	12	23	23

Figure 3

Mean Number Correct on Length Expressive Test

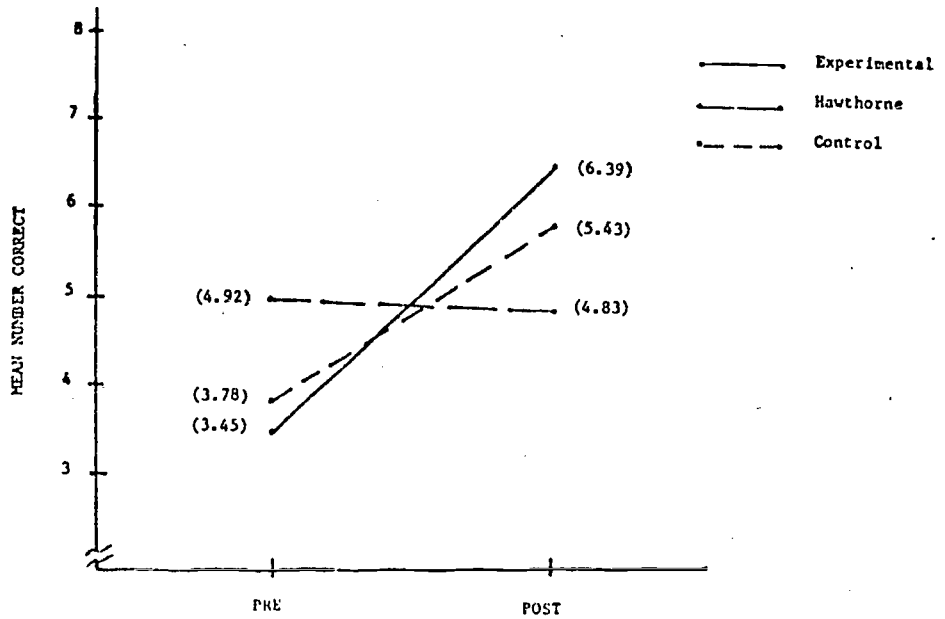


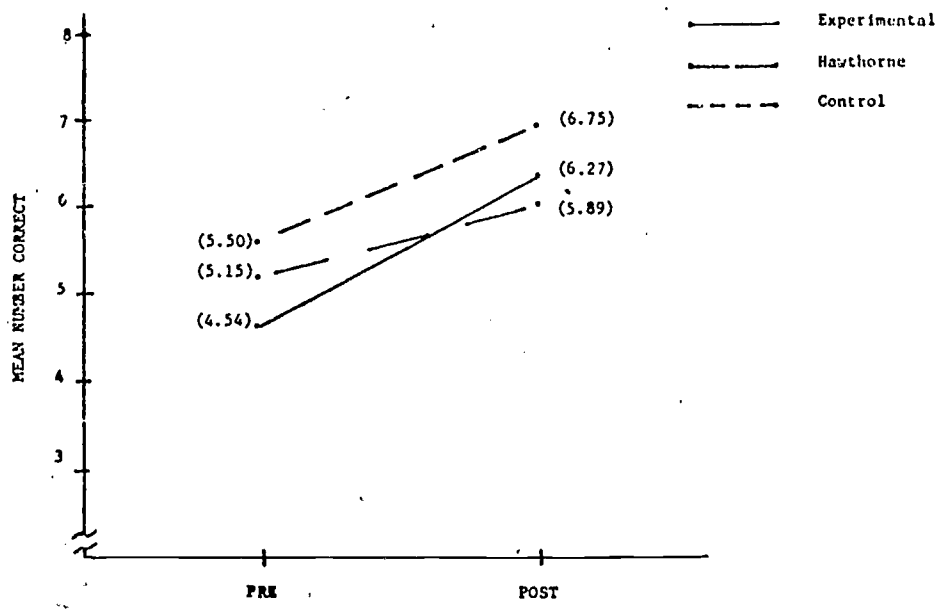
Table 8

Pretest to Posttest Scores of Subject Receiving both Pre and Post Length Skills Test

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	4.54	6.27	5.15	5.89	5.50	6.75
Standard Deviation	2.62	2.60	2.40	2.44	2.10	2.46
n	52	52	27	27	28	28

Figure 4

Mean Number Correct on Length Skills Test



data for both the Length Expressive and Skills tests, and results of statistical analyses on these data, can be found in the summative evaluation report for the Length Unit (Krus, Thurlow, Turnure, & Taylor, 1974b).

Table 9 presents the item by item performances of the Experimental, Hawthorne, and Control groups on the Length tests. In this table, the items from the two Length tests have been integrated and ordered according to the sequencing of the instruction in the Unit. The Experimentals performed better than both of the other groups on only 11 of the 24 items. There appeared to be several test items which may not have adequately assessed the target behavioral objectives. For example, all groups performed extremely low when required to identify an instance of "as close as." The assessment of "measures feet" also indicated relatively low performance levels which, at least for the Experimentals, seem inappropriate given the higher performance on the more difficult item requiring the measurement of feet and inches.

On many items, however, the Experimentals performed at a level higher than the Hawthornes and Controls, despite their lower ability level (Krus, Thurlow, Turnure, & Taylor, 1974b). This is especially true on the Expressive items. The Experimentals' labeling of "far" (73% as compared to 32% and 37%)and their labeling of "longer than a foot" (78% compared to 47% and 57%) showed performance levels which were superior to those of the other two groups. The performance levels on other items, however, do suggest that the instruction in

Table 9

Per Cent Responding Correctly in Each Group on Individual Length Test Items

	Experimentals Receiving Instruction	Hawthornes	Controls
Labels far	73	32	37
Identifies farthest	84	89	97
Identifies as close as	12	11	13
Identifies taller than	62	75	70
Labels tallest	62	65	57
Identifies longest	98	100	100
Demonstrates shorter than	55	81	90
Labels shorter	55	41	50
Orders shortest to longest	55	56	63
Labels measuring	85	68	80
Identifies measuring tools	79	86	83
Describes measuring tools	27	26	43
Demonstrates measurement of how far	65	56	60
Labels ruler	100	94	83
Labels foot	0	0	3
Measures feet	23	8	17
Labels longer than foot	78	47	57
Labels yard	24	0	0
Demonstrates inch	46	36	50
Labels inches	69	56	57
Measures inches	56	42	37
Labels length	43	29	37
Describes height	39	56	57
Measures feet & inches	35	12	17

the Measurement of Length Unit needs to be supplemented to be more effective for the EMR child. Additional instruction and practice, especially on measurement skills, is clearly indicated by the item analysis.

Table 10 presents the retention data for the Length Skills and Expressive tests. The procedures and purpose of this testing were the same as for the Money Unit. As the data in Table 10 indicate, retention of the content of the Measurement of Length Unit was evident. After a period of two months, the Experimental children had retained mastery of the length concepts they had learned. Again, the slight increases in the scores which occurred between posttesting and retention testing were not statistically significant.

Measurement of Weight Unit

The field-test of the Measurement of Weight Unit occurred during the spring of 1974. Unfortunately, only four to six weeks were available for the field-test, and many teachers rushed to complete the Unit, while others failed to progress very far into the instruction. There were 227 children involved in this field-test, with 66 children in the Experimental group, 79 in the Hawthorne group, and 82 in the Control group.

Data related to the Weight Expressive Test are presented in Table 11 and Figure 5. Both the Experimental and Control groups showed significant gains from pretest to posttest. Clearly, however, the 3.37 point gain made by the Experimental group was greater than the .82 point gain made by the Control group. The children in the

Table 10

Length Skills and Expressive Test Scores for Experimental Subjects at Posttesting and Two Months Later (Retention)

	Posttest	Retention
Length Expressive Test (13 items)		
$\overline{X}$	5.73	6.48
SD	3.04	3.25
n	56	42
Length Skills Test (11 items)		
$\overline{X}$	5.98	6.95
SD	2.78	2.62
n	58	42

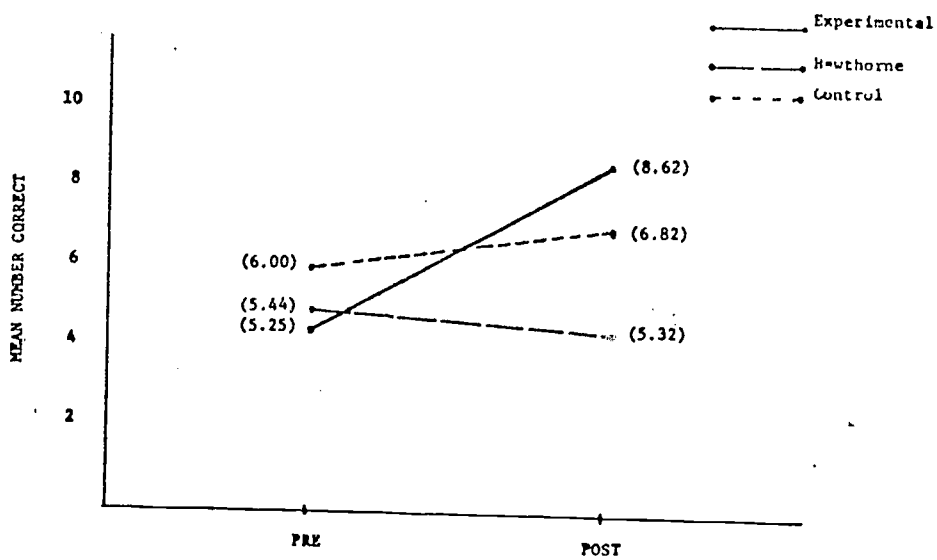
Table 11

Pretest to Posttest Scores of Subjects Receiving both Pre and Post Weight Expressive Tests

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	5.25	8.62	5.44	5.32	6.00	6.82
Standard Deviation	2.95	2.81	2.92	3.14	2.60	2.50
n	55	55	25	25	39	39

Figure 5

Mean Number Correct on Weight Expressive Test



Experimental group progressed from the lowest level of the three groups at the pretest to the highest level at the posttest.

The mean pretest to posttest scores on the Weight Skills Test are given in Table 12, and are presented graphically in Figure 6. Although both the Experimental group and the Control group made significant gains from pretest to posttest, the gains made by the Experimental group were again greater (1.36 points vs .59 points). As shown in Figure 6, the children in the Experimental group started at a level lower than the Controls and progressed to a higher level. (See Krus, Thurlow, Turnure, & Taylor, 1974c, for further effectiveness data and the results of statistical analyses on both the Expressive and Skills tests.)

The item by item performances of the three groups are presented in Table 13. The items from the two Weight tests have been integrated and ordered according to the sequencing of the Weight Unit instruction in this table. The Experimentals performed better than both of the other groups on 20 of the 27 items. Investigation of the scores indicates that the three groups performed comparably on the lower level items. On the more advanced items, however, the Experimental group showed performance levels significantly higher than those of the other two groups. For example, on the item requiring the children to relate a pound to a balance, 97% of the Experimentals responded correctly. Similar performance differences occurred on the items requiring the children to read "1 lb.": 65% of the Experimentals responded correctly, while only 3% of the Hawthornes

Table 12

Pretest to Posttest Scores of Subjects Receiving both Pre and Post Weight Skills Test

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	6.78	8.14	6.70	6.94	6.90	7.69
Standard Deviation	2.67	2.44	2.19	2.29	2.24	2.23
n	55	55	33	33	39	39

Figure 6

Mean Number Correct on Weight Skills Test

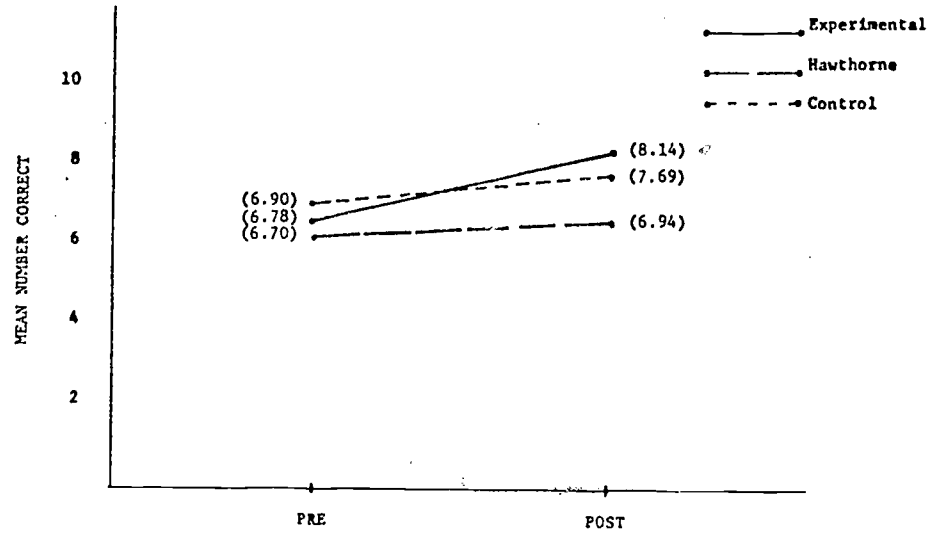


Table 13

Per Cent Responding Correctly in Each Group on

Individual Weight Test Items

	Experimentals Receiving Instruction	Hawthornes	Controls
Identifies heavy	79	82	82
Identifies light	97	95	95
Uses comparative heavy	97	72	87
Identifies heavier	95	97	97
Uses comparative heaviest	84	56	69
Uses comparative lighter	68	31	64
Labels balance scale	24	6	8
Identifies lighter	58	45	67
Uses heavier than	74	56	77
Uses as heavy as	79	39	64
Demonstrates as heavy as	64	53	54
Identifies scale	87	50	67
Defines scale	85	78	87
Defines weighing	45	28	51
Matches scale to function	51	45	49
Uses pounds	75	69	59
Picks scale with weight 1 pound	83	84	75
Relates a pound to a balance	97	25	36
States weight from balance scale	57	29	38
Reads 1 lb.	65	3	10
Picks scale showing weight of more than 20 pounds	78	45	72
Picks scale with weight 7 ounces	59	21	31
Reads weight in ounces	35	3	3
States number of ounces in pound	22	0	3
States which is heavier: 1 pound or 5 ounces	59	16	28
Reads 20 oz.	41	0	0
Identifies which is heavier: 3 tons or 3 pounds	88	82	82

and 10% of the Controls responded correctly. On the most advanced items in the instruction, however, the differences between the scores of the three groups were less striking. This might reflect the fact that instruction at the end of the Unit was rushed rather than inadequate.

No retention testing was given after the instruction in the Weight Unit ended since instruction was not concluded until the end of the school year.

Time with the Clock Unit

The field-test of the Time with the Clock Unit took place at the same time as the field-test of the Measurement of Weight Unit. Again, because of time limitations, the instruction was often either rushed or unfinished. There were 227 children involved in the field-test of the Time with the Clock Unit, with 79 children in the Experimental group, 66 in the Hawthorne group, and 82 in the Control group.

In testing the Time with the Clock Unit, only one test was administered. This test included items related to both the skills and the expressive concepts included in the Unit. The pretest to posttest data for the Time Test are given in Table 14, and these are presented graphically in Figure 7. Only the children in the Experimental group showed statistically significant performance gains from pretest to posttest ($p < .005$). Observation of Figure 7 clearly indicates that the performance of the Hawthorne and Control groups remained essentially the same, while the Experimental group gained an average of over four points, moving from the lowest performance level

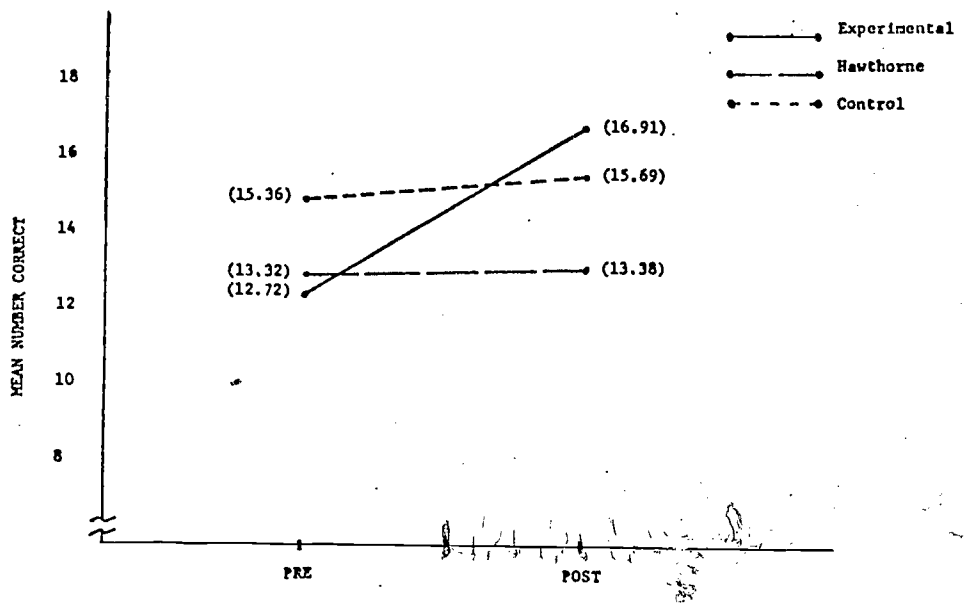
Table 14

Pretest to Posttest Scores of Subjects Receiving both Pre and Post Time Test

	Experimental		Hawthorne		Control	
	Pre	Post	Pre	Post	Pre	Post
Mean	12.72	16.91	13.32	13.28	15.36	15.69
Standard Deviation	5.42	6.24	5.42	5.44	6.46	6.49
n	69	69	28	28	33	33

Figure 7

Mean Number Correct on Time Test



to the highest from pretest to posttest. (See Krus, Thurlow, Turnure & Taylor, 1974d, for further effectiveness data and the results of statistical tests.)

The performances of the three groups in the field-test of the Time with the Clock Unit are presented in Table 15 in terms of the percentage of children responding correctly to each item. On 15 of the 25 items corresponding to the instruction Experimentals received, the Experimentals showed higher performance levels. Performances on the initial items were quite similar across groups, however, with the notable exception being the item which required the children to label the face of a clock (80% for Experimentals vs. 7% and 21% for Hawthornes and Controls, respectively). The only atypical performance level occurring in the initial items is on the item requiring the identification of "afternoon." Either this objective is very difficult to master (as indicated by the low performance in all groups), there was not enough instruction, or the test item was inappropriate.

Performances on the following items demonstrate the superiority of the Experimental group. For example, when asked to tell time to the half hour, a relatively unmastered objective before the field-test began, 76% of the Experimentals, and only 25% and 48% of the Hawthornes and Controls, respectively, could do so on the posttest.

Performances in the Experimental group, even on the most difficult items (the last items in the table), were quite good compared to those of the other two groups. Unfortunately none of the

Table 15

Per Cent Responding Correctly in Each Group on

Individual Time Test Items

	Expermentals Receiving Instruction	Hawthornes	Controls
Labels dark	95	89	100
Labels night	85	93	88
Labels morning	85	78	88
Identifies afternoon	43	46	39
Identifies after	73	57	73
Identifies before	75	68	70
Identifies early	67	75	67
Identifies late	62	61	67
Identifies clock	96	96	100
Defines clock	91	89	94
Labels face	80	7	21
Labels hands	92	50	61
Labels numbers	92	100	100
Defines hands	80	46	67
Defines o'clock	73	39	54
Tells time on the hour	92	64	79
Demonstrates o'clock	86	46	64
Demonstrates movement of hands	48	32	42
Tells time to half hour	76	25	48
Demonstrates half hour	80	6	36
Identifies half hour	50	25	48
Counts by fives	58	4	15
Identifies minute hand	83	61	42
Defines half hour	83	11	21
Tells time 5 minutes after (2:20)	33	7	18
Tells time exactly (4:11)	-	7	15
Demonstrates exact minute after (3:18)	-	4	15
Tells time 5 minutes before (3:45)	-	11	18
Tells time exact minute before (8 to 3)	-	4	9
Demonstrates exact minutes before (9 to 5)	-	4	9

Experimental classes received the most advanced instruction in the Unit, that relating to telling time to any minute on the clock, and thus the effectiveness of this instruction could not be ascertained.

As in the field-test of the Measurement of Weight Unit, no retention testing was given after instruction in the Time with the Clock Unit had ended. Retention testing would have been unrealistic during the present field-test since instruction was not concluded until the end of the school year.

Community Location Comparisons

The second factor of interest in the present field-test was that of community location. During the development and initial pilot-testing of each unit, the target population had been EMR children from an urban population area. The field-test was designed so that the general effectiveness of the units for different types of communities (rural and suburban, as well as urban) could be assessed.

In the field-test of all units, a superiority by the children in the rural community emerged. (See Krus, Thurlow, Turnure, & Taylor, 1974a,b,c,d, for complete descriptions of the community location comparisons.) This superiority, however, seemed to reflect a population difference rather than a difference in the effectiveness of the instruction, since rurals in all three groups (Experimental, Hawthorne, and Control) tended to perform at a higher level than urban and suburban children in the same groups.

Nonretarded Data: Unit Tests

Each unit was administered to a sample of children from a "normal" population. This was done to compare the performances of EMR children receiving the instruction with those of the nonretarded children. Children from kindergarten through third grade were selected for testing. Overall, 291 nonretarded students were tested. These children came from 15 classes in urban and suburban school systems. Specifically, the breakdown of classes tested was as follows: Four kindergarten classes (n = 83), five first-grade classes (n = 91), three second-grade classes (n = 56), and three third-grade classes (N = 61). Table 16 shows the mean chronological age (CA) for each grade.

Since the EMR children had a mean CA of 102.3 months and a mean MA of 73.9 months (see Table 1), they were comparable in CA to the third-grade children tested, and comparable in MA to children between the kindergarten and first-grade levels. The ideal, of course, would be for the performances of the retarded children, after instruction, to match those of their nonretarded same-age (CA) peers.

The unit tests were administered to the nonretarded children at the end of the school year. In all, seven tests were given (Money Skills, Money Expressive, Length Skills, Length Expressive, Weight Skills, Weight Expressive, and Time), with each child being tested on only a random subset of the tests (i.e., each child was given from one to four of the seven tests). The number of children tested in each grade varied, due to time constraints and scheduling difficulties. The data will be presented here by Unit, and will include the EMR data for comparisons.

Table 16

Mean CA (in Months) for Nonretarded Population by Grade

	Kg.	1st	2nd	3rd
$\bar{X}$	68.45	80.18	99.36	103.35
SD	5.51	4.24	10.53	4.56
Range	62-78	72-94	85-111	96-119
n	83	91	56	61

Money Unit. Tables 17 and 18 show the overall performances of the nonretarded children on the Money Expressive and the Money Skills tests, for each grade. The pretest and posttest results for the EMR children who received the instruction in the Money Unit are also presented. As would be expected, the nonretarded children's means increase from kindergarten to the third grade, with a slight performance anomaly noted on the Expressive test (children in the second grade showed a slightly higher mean than those in the third grade).

The overall posttest performances of the EMRs on both tests appear to correspond to that of their nonretarded MA peers. Investigation of the EMRs pretest data (Krus, Thurlow, Turnure, & Taylor, 1974a, see Tables 5 and 6) indicated that on the Expressive test they had a mean of 9.09 (SD = 3.92) and on the Skills test they had a mean of 4.73 (SD = 4.66). In other words, at the pretest, the EMRs performed well below children at the kindergarten level; at posttest, they performed comparably to normal children of the same mental age, but below normal children of the same chronological age.

The item by item performances of the nonretarded children and the Experimental retarded children are presented in Table 19. Again, these items represent an integration of the items from the two Money tests, and are arranged according to the sequencing of instruction. As noted in the overall scores, the pretest levels of the EMRs are generally below that of the kindergarten children. In those cases where normal classes are ordered as expected (i.e., with the lowest performance level for the kindergarten children and the highest performance level for the third grade children), the EMRs generally show post-instruction performance levels above that of their MA peers,

Table 17

Mean Number Correct on Money Expressive Test by Nonretarded Children and Experimental EMRs

	Kg.	1st	2nd	3rd	EMR Pretest	EMR Posttest
$\bar{X}$	9.28	13.03	16.71	15.94	9.09	14.33
SD	3.75	3.64	1.44	2.15	3.92	3.39
n	29	26	14	42	33	33

Table 18

Mean Number Correct on Money Skills Test by Nonretarded Children and Experimental EMRs

	Kg.	1st	2nd	3rd	EMR Pretest	EMR Posttest
$\bar{X}$	6.83	10.92	13.94	16.78	4.73	10.64
SD	4.90	5.10	4.89	3.55	4.66	4.66
n	30	27	18	28	64	64

Table 19

Per Cent Responding Correctly on Individual Money Test Items

	Kg.	1st	2nd	3rd	EMR Pre	EMR Post
Describes trading situation	52	72	72	95	58	90
States money when related to store	93	96	100	100	69	84
Selects pictures of money	47	65	56	52	7	34
States save in response to definition	55	76	92	73	42	71
Labels a nickel	63	73	92	95	67	88
States penny in response to definition	59	80	88	100	64	96
States dime in response to definition	38	72	88	100	42	81
Selects dime as coin that buys most	33	65	80	95	31	68
Selects pictures of half-dollar	83	88	96	95	44	94
Names more than 3 coins	38	72	88	100	23	88
Orders 5 coins by value	23	65	96	90	23	61
Selects coins buying more than nickel	33	58	80	95	24	51
Describes why fake bill not real	79	88	92	100	67	74
States "bill" labeling 20 dollar	69	76	88	86	64	89
Selects picture of 5 dollar bill	70	85	76	95	46	94
States "fifty dollar bill"	80	85	88	90	37	82
Labels shopper as "customer"	3	32	16	33	3	27
Labels a cash register	59	52	84	71	33	80
Describes relative value of quarter	79	84	92	100	58	79
States penny is "one cent"	60	92	92	100	54	85
Reads 5¢	59	92	100	100	81	85
Changes nickel for 5 pennies	20	62	76	95	26	59
Responds "change" to definition	14	24	40	38	8	20
States "dime" is 10 pennies	27	54	76	90	14	71
States "quarter" is "25 cents"	23	46	76	95	13	61
States "50 pennies in half dollar"	23	31	68	90	14	56
States "50 cent piece"	10	20	64	76	28	54
States dollar is "100 cents"	23	38	52	95	9	58
Reads $2	31	76	88	95	50	69
Reads $2.30	14	64	84	95	31	67
States 10 dollar bill = 2 fives	20	42	52	76	6	29
Counts 5 nickels	17	46	84	95	11	58
Counts combinations of coins (20¢)	17	54	72	95	17	42
Counts bills and coins ($2.32)	10	23	52	86	10	29
Counts $1 bill and coins ($2.35)	06	13	48	71	7	22
Labels price tag	21	56	76	71	33	56
States that cash is money	66	60	76	76	58	78
Labels "check"	69	72	92	90	39	81
States "change" to definition	24	40	56	71	33	44
Makes change 12¢ from quarter	3	8	12	48	0	4

although generally not reaching the level of their CA peers. Most of the items showing these trends were expressive items (e.g., "Describes a trading situation," "States 'bill' when labeling a 20 dollar bill"). On the key items related to the recognition of the coins and the value of the coins, the EMR children generally performed slightly above the nonretarded first-grade children. For example, when required to label a nickel, 88% of the EMRs responded correctly compared to 73% of the first graders. Similarily, when required to state that a dime is the same as 10 pennies, 71% of the EMRs and 54% of the first graders responded correctly. Although the posttest performance levels of the retarded children did not reach those of their CA peers, they did generally exceed the performance levels of children in the first grade (where the CA of the nonretarded children approximately equalled the MA of the EMRs).

Measurement of Length Unit. Tables 20 and 21 show the overall performances of the nonretarded children on the Length Expressive and Length Skills tests, for each grade. The means for both tests show the expected increase with grade level.

The overall posttest performances of the Experimental EMRs on the tests, also presented in Tables 20 and 21, appear to be at or below that of their MA peers. The posttest performance on the Expressive test was comparable to that of the first-grade children, the group considered to be the EMRs match for MA. On the Skills test, however, the EMRs performed at a level similar to that of the kindergarten children, a group considered to be of a lower MA level.

Table 20

Mean Number Correct on Length Expressive Test by Nonretarded Children and Experimental EMRs

	Kg.	1st	2nd	3rd	EMR Pretest	EMR Posttest
$\bar{X}$	4.43	6.41	6.56	8.00	3.45	6.39
SD	2.57	1.61	2.57	2.32	2.67	3.12
n	30	24	23	23	31	31

Table 21

Mean Number Correct on Length Skills Test by Nonretarded Children and Experimental EMRs

	Kg.	1st	2nd	3rd	EMR Pretest	EMR Posttest
$\bar{X}$	6.11	8.39	8.96	9.74	4.54	6.27
SD	2.48	1.62	1.18	1.36	2.62	2.60
n	28	28	23	23	52	52

Investigation of the EMR pretest data (Krus, Thurlow, Turnure, & Taylor, 1974b, see Tables 5 and 6) indicated that on the Expressive test they had a mean of 3.45 (SD = 2.67) and on the Skills test they had a mean of 4.54 (SD 2.62). Thus, even though the EMRs performed well below the kindergarten children on the pretest, their posttest performances showed significant gains. Unfortunately, only the gain on the Expressive test brought the children up to a level comparable to their MA peers.

The item by item performances of the nonretarded children and the Experimental retarded children are presented in Table 22. The items in this table are arranged according to the sequencing of instruction. Clearly, the pretest data of the EMRs were quite consistently below the level of the kindergarten children. On the items where the expected increase across grades was observed, the EMR children did not show any consistent performance trends from pretest to posttest like those noted on the Money tests. In some cases, the EMRs performed above their MA peers, and in some cases, they performed below them. A look at the performance of the EMRs on certain key items is quite interesting. These items include those typically associated with length and its measurement (e.g., orders items on basis of length, labels a ruler, measures feet, measures inches, measures feet and inches). On two of these items (ordering, measuring inches), the EMRs performed slightly below their MA peers. On the other three items, however, their performances approached or exceeded those of their CA peers.

Table 22

Per Cent Responding Correctly on Individual Length Test Items

					EMR	
	Kg.	1st	2nd	3rd	Pre	Post
Labels far	45	38	70	61	22	73
Identifies farthest	93	100	100	100	74	84
Identifies as close as	36	43	48	70	8	12
Identifies taller than	78	89	94	100	68	62
Labels tallest	45	62	9[illegible]	83	32	62
Identifies longest	100	100	100	100	92	98
Demonstrates shorter than	89	96	100	100	52	55
Labels shorter	38	71	57	70	40	55
Orders shortest to longest	46	89	94	100	34	55
Labels measuring	79	88	65	96	59	85
Identifies measuring tools	89	93	100	96	50	79
Describes measuring tools	45	75	57	57	5	27
Demonstrates measurement of how far	25	86	91	83	32	65
Labels ruler	66	96	96	96	65	100
Labels foot	10	0	9	0	0	0
Measures feet	7	18	13	48	5	23
Labels longer than foot	62	75	61	74	27	78
Labels yard	0	4	9	30	5	24
Demonstrates inch	43	57	74	87	14	46
Labels inch	55	71	78	87	30	69
Measures inches	21	71	78	91	18	56
Labels length	7	0	7	48	11	43
Describes height	14	54	30	52	14	39
Measures feet and inches	3	4	17	48	3	35

The performances of the EMRs on the Length tests, in comparison to the nonretarded children, do not appear to be as impressive as they had been in the Money Unit. Nevertheless, the levels achieved on several key items were quite impressive, and showed the EMR children progressing to the level of their CA peers.

Measurement of Weight Unit. The overall data for the nonretarded children and the Experimental retarded children on the Weight tests are presented in Tables 23 and 24. Once again, the expected increase across grades for the nonretarded children is evident.

The overall posttest performance of the EMRs on the Weight Expressive test is definitely above that of their MA peers, the first-grade children, and is very comparable to the performance of the second-grade children. On the Weight Skills test the posttest performance level of the EMRs is quite similar to the performance levels of their MA peers. These comparisons are more impressive when one considers that the pretest performances of the EMRs on both the Expressive test ($\bar{X}$ = 5.25, SD = 2.95) and the Skills test ($\bar{X}$ = 6.78, SD = 2.67) were below those of the normal kindergarten children (cf. Krus, Thurlow, Turnure, & Taylor, 1974c, see Tables 5 and 6).

Performances of the normals and Experimental retarded children on individual items are presented in Table 25. Again the pretest levels of the EMRs are generally below those of the kindergarten children. On several of the initial items where the normals show the

Table 23

Mean Number Correct on Weight Expressive Test by Nonretarded Children and Experimental EMRs

	Kg.	1st	2nd	3rd	EMR Pretest	EMR Posttest
$\bar{X}$	6.17	7.67	8.63	9.00	5.25	8.62
SD	2.39	2.46	1.50	1.68	2.95	2.81
n	30	27	32	22	55	55

Table 24

Mean Number Correct on Weight Skills Test by Nonretarded Children and Experimental EMRs

	Kg.	1st	2nd	3rd	EMR Pretest	EMR Posttest
$\bar{X}$	7.03	8.59	9.13	9.95	6.78	8.14
SD	2.07	2.26	1.83	1.69	2.67	2.44
n	32	27	30	21	55	55

Table 25

Per Cent Responding Correctly on Individual Weight Test Items

	Kg.	1st	2nd	3rd	EMR Pre	EMR Post
Identifies heavy	78	85	87	95	80	79
Identifies light	100	100	100	100	93	97
Uses comparative heavy	83	92	75	73	57	97
Identifies heavier	96	96	100	100	92	95
Uses comparative heaviest	83	81	68	95	57	84
Uses comparative lighter	60	62	68	73	47	68
Labels balance scale	3	8	0	5	2	24
Identifies lighter	56	74	53	77	55	58
Uses heavier than	60	92	75	91	45	74
Uses as heavy as	30	77	81	95	33	79
Demonstrates as heavy as	78	85	87	95	35	64
Identifies scale	70	69	68	77	42	87
Defines scale	83	92	71	100	72	85
Defines weighing	27	62	81	77	35	45
Matches scale to function	37	56	57	68	47	51
Uses pounds	63	85	71	86	65	75
Picks scale with weight 1 pound	59	74	90	91	72	83
Relates a pound to a balance	43	73	62	64	37	97
States weight from balance scale	34	63	73	77	27	57
Reads 1 lb.	3	0	15	23	7	65
Picks a scale showing weight of more than 20 pounds	46	78	83	77	48	78
Picks scale with weight 7 ounces	28	37	43	59	38	59
Reads weight in ounces	0	0	9	18	5	35
States number of ounces in a pound	0	4	0	5	0	22
States which is heavier: 1 pound or 5 ounces	12	33	53	59	20	59
Reads 20 oz.	3	8	40	27	8	41
Identifies which is heavier: 3 tons or 3 pounds	78	74	90	95	60	88

expected performance increases across grades, the EMRs generally perform at a posttest level comparable to the first-grade children, their MA peers. On the more advanced items in the test (e.g., identifies scale reading 7 oz., reads weight in ozs., indicates one lb. is heavier than 5 oz.), however, the EMR children perform at or above the level of the third-grade children, their CA peers.

Time with the Clock Unit. Table 26 presents the comparison data for the Time test. Unfortunately, the data for the nonretarded children do not show the typical increase across grades. The first-grade children appear to be performing extremely well, a finding which limits the generalizability of the data.

The posttest performance of the EMR children on the Time test is below that of the first-grade children, but because of the atypical performance of the normals, the performance of the EMRs also approaches that of the second-grade children. These data are difficult to interpret, but it is interesting to note that at the pretest the EMRs achieved a mean performance level of 12.72 (SD = 5.42), a level below that of the kindergarten children (cf. Krus, Thurlow, Turnure, & Taylor, 1974d, see Table 4). From the pretest to the posttest, their performances show significant increases, especially in view of the performances of nonretarded children.

Table 27 presents the item by item performances of non-retarded children and the Experimental children on the Time test. Because of the problem previously noted, few of the items show the

Table 26

Mean Number Correct on Time Test by Nonretarded Children and Experimentals EMRs

					EMR	
	Kg.	1st	2nd	3rd	Pretest	Posttest
$\bar{X}$	13.71	19.69	17.91	22.57	12.72	16.91
SD	3.73	5.27	3.13	4.24	5.42	6.24
n	31	26	25	30	69	69

Table 27

Per Cent Responding Correctly on Individual Time Test Items

					EMR	
	Kg.	1st	2nd	3rd	Pre	Post
Labels dark	94	100	100	100	90	95
Labels night	94	100	100	100	89	85
Labels morning	100	96	100	100	78	85
Identifies afternoon	42	62	80	90	39	43
Identifies after	84	88	92	97	61	73
Identifies before	87	96	96	97	62	75
Identifies early	87	92	100	100	74	67
Identifies late	74	73	92	87	50	62
Identifies clock	100	100	100	100	90	96
Defines clock	100	100	100	100	89	91
Labels face	10	8	32	40	15	80
Labels hands	77	81	76	83	62	92
Labels numbers	94	100	100	100	89	92
Defines hands	71	92	92	97	54	80
Defines o'clock	32	85	72	93	42	73
Tells time on hour	52	96	76	97	46	92
Demonstrates o'clock	42	88	76	97	49	86
Demonstrates movement of hands	16	50	56	63	22	48
Tells time to half hour	10	81	24	77	15	76
Demonstrates half hour	19	81	36	90	18	80
Identifies half hour	22	54	52	83	31	50
Counts by fives	3	35	24	70	17	58
Identifies minute hand	29	50	56	50	42	83
Defines half hour	22	54	52	83	42	83
Tells time 5 minutes after (2:20)	6	12	12	47	10	83
Tells time exact minute after (4:11)	0	26	0	30	0	-
Demonstrates exact minute after (3:18)	6	26	8	37	3	-
Tells time 5 minutes before (3:45)	6	15	4	40	4	-
Tells time exact minute before (8 to 3)	0	15	0	20	1	-
Demonstrates minutes before (9 before 5)	0	26	4	33	4	-

expected performance increase across grades. On many items, the EMRs performed below the first-grade children, but again, this is difficult to interpret because of the high performance level found for the first graders tested.

It is notable, however, that on several key items, the EMRs showed exceptional performances, even as compared to third grade children. When asked to label the face of a clock 80% of the EMRs could do so, while only 40% of the third grade nonretarded children could. Eighty percent of the EMRs could tell time to a five-minute interval after the hour while only 47% of the normal third-grade children could.

It is unfortunate that the field-test of the Time with the Clock Unit had to be cut short. None of the Experimental retarded children received instruction related to the last five items on the test. One might expect, however, that similar impressive levels of performance might be observed for the EMR children on these items.

Cognitive Abilities Test

Sixteen of the EMR field-test classes were pretested and posttested on the Cognitive Abilities Test (Thorndike, Hagen & Lorge, 1968). The CAT was employed to evaluate the children's general improvement in non-content specific areas of cognitive functioning after a full year of instruction in the Money, Measurement and Time Program.

Specifically, two parts of the Primary I/Form 2 CAT were administered. The Relational Concepts subtest (16 items) was

designed to assess the ability to identify size, position, and quantity (e.g., Find the pile with the "least sand"; find the one who is "young, but not the youngest"). The Multi-mental subtest (16 items) was designed to assess the ability to see relationships and to categorize or classify objects (e.g., Find the one that does not belong). The data presented here are only for those children both pretested and posttested on each subtest.

Overall, there were 122 children tested on the Relational Concepts subtest; 78 of these received experimental materials, the other 44 were in the Control group. Forty-six Experimental group children received instruction in the Money and Time Units or in the Money Unit alone during the 1973-74 academic year. Thirty-two Experimental group children received instruction in the Length and Weight Units or in the Length Unit alone. The mean pretest and posttest performances of these two groups, and of the Control group, are presented in Table 28. These data are presented graphically in Figure 8.

The three groups clearly showed unequal initial levels of performance on the Relational Concepts subtest of the CAT. The Length/Weight group was lowest, and the Control group was highest. Tests of the initial CAT scores revealed that both the Control group, t (74) = 4.52, $p < .001$, and the Money/Time group, t (76) = 3.64, $p < .001$, had higher mean pretest scores than the Length/Weight group; the difference between the Control and Money/Time groups was not significant.

Table 28

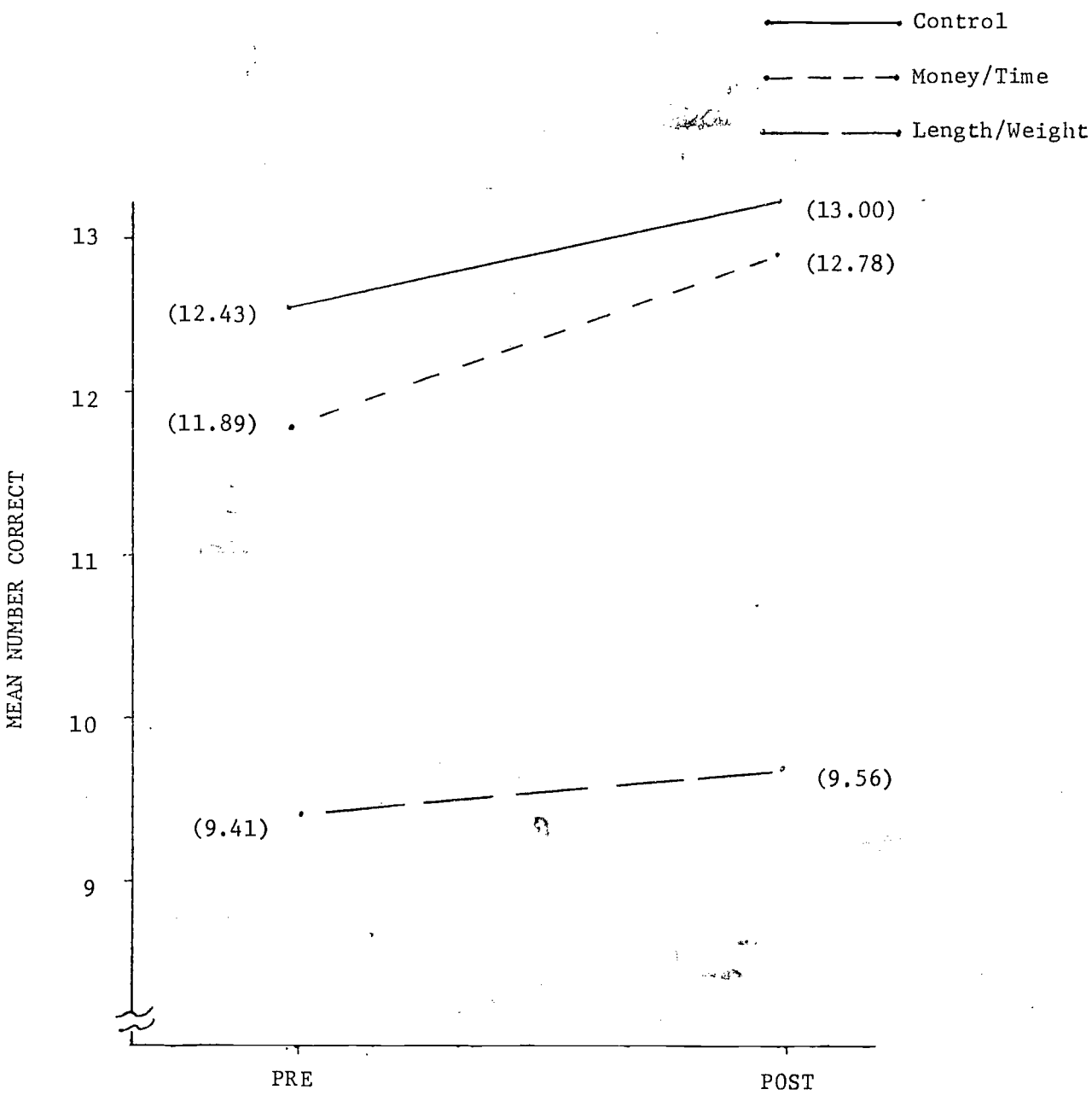
Means and Standard Deviations of Pretest and Posttest Performances on Relational Concepts Subtest of CAT

	Pretest	Posttest	
Money/Time			
$\bar{X}$	11.89	12.78	$t = 3.07$
SD	2.29	2.43	$p < .01$
n	46	46	
Length/Weight			
$\bar{X}$	9.41	9.56	$t < 1$
SD	3.64	3.03	ns
n	32	32	
Control			
$\bar{X}$	12.43	13.00	$t = 2.18$
SD	2.06	2.21	$p < .05$
n	44	44	

Figure 8

Mean Number Correct on Relational Concepts Subtest

of Cognitive Abilities Test



The significance of the change in performance from pretest to posttest for each of the three groups was tested by means of a t test for related measures. The results of these tests are presented along with the means in Table 28. Only the Length/Weight group did not show a significant increase from pretest to posttest. Both the Money/Time group and the Control group showed significant increases from pretest to posttest. The increase by the Money/Time group was slightly larger, although still only showing an increase of less than one point. No normative data on expected changes which would occur over a year were available.

On the Multi-mental subtest, 99 children were both pretested and posttested; 55 of these were Experimental group children, the other 44 were in the Control group. Forty-one of the Experimental group children received instruction in the Money and Time Units or in the Money Unit alone during the 1973-74 field-test. Fourteen Experimental group children received instruction in the Length and Weight Units or in the Length Unit alone. The mean pretest and posttest performances of the three groups are presented in Table 29. These data are presented graphically in Figure 9.

Again, the initial performance levels of the three groups were not equivalent. The Length/Weight group appeared to be clearly lower than the Money/Time and Control groups, which were approximately equal. Tests of the initial CAT scores revealed that only the Control group had a higher pretest score than the Length/Weight group, $t\ (56) = 2.18$, $p < .05$. The Money/Time group was not

Table 29

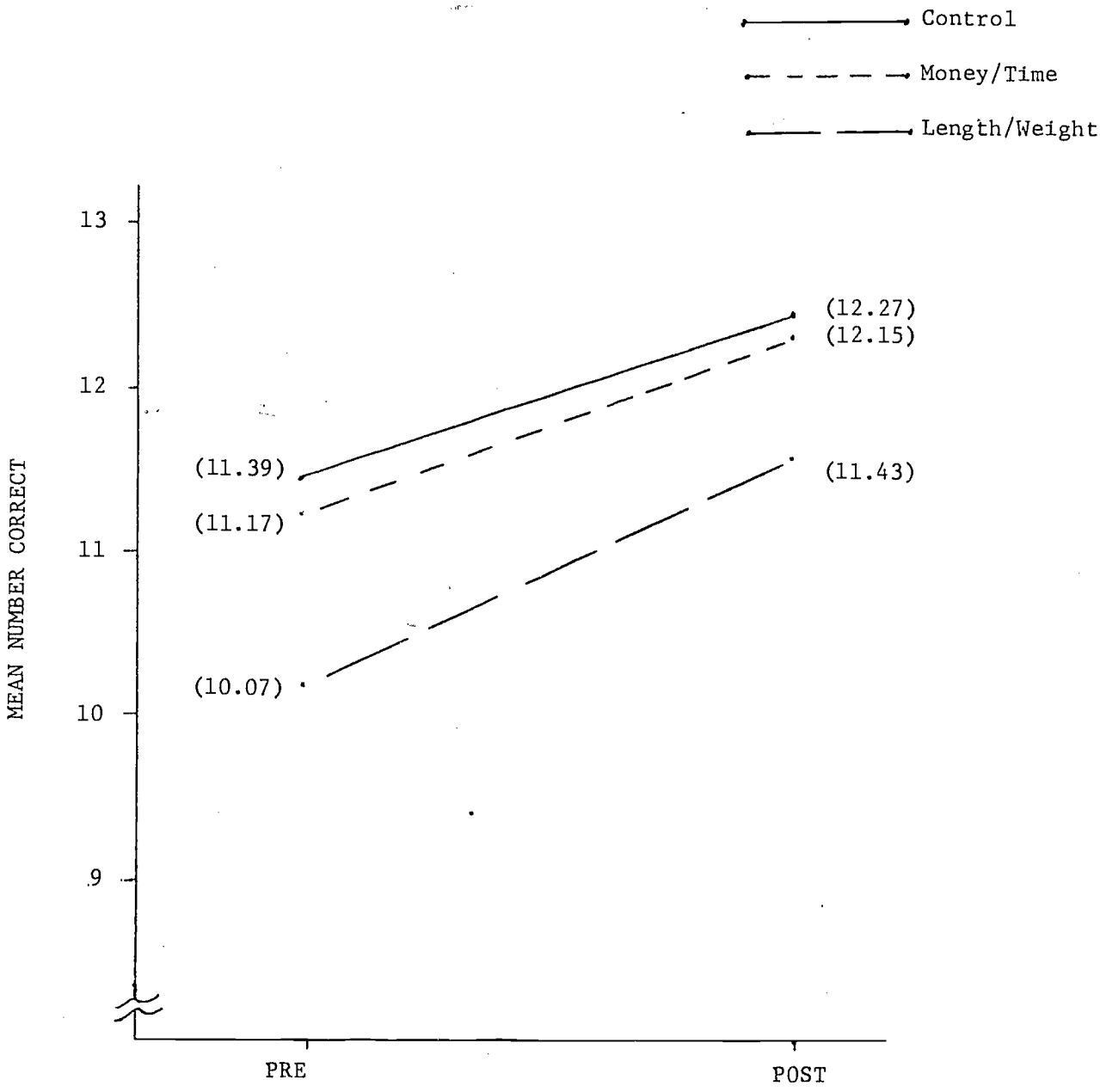
Means and Standard Deviations of Pretest and Posttest Performances on Multi-mental Subtest of the CAT

	Pretest	Posttest	
Money/Time			
$\overline{X}$	11.17	12.15	$t = 2.29$
SD	3.03	2.84	$p < .05$
n	41	41	
Length/Weight			
$\overline{X}$	10.07	11.43	$t = 2.61$
SD	3.10	2.44	$p < .05$
n	14	14	
Control			
$\overline{X}$	11.39	12.27	$t = 2.47$
SD	1.37	1.65	$p < .02$
n	44	44	

Figure 9

Mean Number Correct on Multi-mental Subtest

of Cognitive Abilities Test



significantly different from either the Length/Weight group or the Control group at the time of pretesting.

The significance of the change in performance from pretest to posttest for each of the three groups was tested by means of a t test for related measures. The results of these tests are presented along with the means in Table 29. All three groups showed significant increases from pretest to posttest on the Multi-mental subtest. The 1.36 point gain made by the Length/Weight group was only slightly larger than the gains made by the Money/Time (.98) and Control (.88) groups. Again, no normative data on expected changes over a year were available.

Discussion

The pretest, posttest, retention test and Cognitive Abilities Test data from the EMR children, in addition to the test data from the nonretarded children, were important sources of information during the field-test of the Money, Measurement and Time Program. These data not only provided information about the useability and effectiveness of the Money, Length, Weight, and Time Units, but also helped to identify aspects of the instruction needing revision before the materials would be ready for commercial publication.

The results of the pretesting and posttesting formed the basis for the evaluation of the effectiveness of the four units being field-tested. The pretest to posttest gains in the Money and Time with the Clock Units were quite impressive, and indicate that these units are very close to being considered final. The pretest and posttest data related to the measurement of Length and Measurement of Weight Units

were not as impressive as those for the Money and Time Units, except for the data obtained from the Weight Expressive Test.

For all units, the item analyses of the Unit tests revealed that the learning of the EMR children went beyond the immediate instruction the children had received. In other words, the children performed better than would be expected on test items related to instruction coming after the point at which their instruction was ended. Unfortunately, it cannot be determined from the present data whether these performance increases were due to a sensitization of the children toward their environment (e.g., towards time), or simply to incidental instruction occurring in the classroom.

Retention testing also provided further effectiveness data in the present field-test. Those children tested for retention were found not only to retain the information they had learned, but also, to show slight increases in performance levels two months after instruction had ended. Such increases might reflect reminiscence, generalization of learning, and/or enhanced awareness of the environment.

Data from nonretarded children provided a form of normative data which supported the importance of providing instructional materials to EMR children. For instance, these data indicated the potential of the Money and Time Units for bringing children from a performance level far below that of MA-matched normal children up to the level of these normal children, and in some instances, up to the level of CA-matched normal children.

The Cognitive Abilities Test results did not reflect any special effectiveness of the instruction for increasing the children's scores on a standardized test of "cognitive functioning." On the Multi-mental subtest, all groups made relatively equivalent and significant gains from pretest to posttest. On the Relational Concepts subtest, however, only the Control and Money/Time groups made significant increases; the Length/Weight group did not, even though the subject matter they covered was considered to be quite close to that tested in the Relational Concepts subtest. Some caution must be observed when drawing conclusions from the data for the Length/Weight group, however, since this group was found to be significantly poorer than the other two groups on the pretest. Given the instability of the test for young children (cf. Buros, 1972, p. 639) and its requirement for listening skills and acute visual discrimination (cf. Buros, 1972, p. 640), the test may not have adequately discriminated increases by children starting at very low levels of performance.

Recommendations for Revisions

Several recommendations for revision were generated as a result of the field-test of four of the units in the Money, Measurement and Time Program. Some of the recommendations came out of the effectiveness data obtained during the field-test, but a majority of the recommendations were proposed by the field-test teachers on evaluation forms and "comment cards."

A few of the recommended revisions were very specific in nature, dealing occasionally with poor tape quality, inappropriate

pictures, etc. For instance, in the Weight Unit there is one example in which the children are told that one hot dog weighs one ounce and therefore is lighter than one pound of hotdogs. However, in the accompanying picture, the pound of hotdogs contains only twelve hotdogs, an inappropriate number if each hot dog weighs one ounce. Such problems were encountered occasionally in all units, and the teachers provided helpful suggestions for specific changes to make.

The most important recommendations for revision, however, dealt with the content of the units and the general form of the materials in the Program. The specific content recommendations for each unit will be discussed first, and then the overall recommendations for materials revisions will be presented.

Money Unit. Two major suggestions were made with respect to the content of the Money Unit. First, it was suggested that more realistic representations of the coins should be used in pictures. Ideally, these would be photographs of coins. With the knowledge that many standardized tests and math texts do not use photographs, the Vocabulary Development Project suggests that both photographs of the coins and artists' representations be used. The photographs would be used initially to insure correct identification, and then the children would be introduced to artists' representations and shown the features which would help them identify the particular coin being represented.

The second major suggestion for revision of the Money Unit related to the need for additional instruction at the end of the

Unit. In the field-test version, the Money Unit concluded with a lesson on making change. However, the instruction dealt only with making change for a nickel. Instruction on making change for the dime, quarter, half dollar, and several bills was not available during the field-test. Teachers indicated that such instruction should definitely be included in the Unit. Furthermore, they noted that such instruction, and possibly also the instruction dealing with counting money should include some tape presentations in addition to classroom activities. No specific reasons were given for this suggestion.

Both of these suggestions seem to be important, and ones which should be implemented before commercial publication of the Money Unit. In addition, staff members of the Vocabulary Development Project have noted a sequencing change which should be made before publication. In its field-test form, Book Four of the Money Unit is used at two different times in the instruction: The first three lessons are used after Book Two, and the remaining lessons after Book Three. The level of difficulty of the concepts in the book suggests that it would be more appropriate to include all low-level store-related concepts as part of Book One instead, and to introduce the more advanced store concepts later, and relate them to counting and change-making skills. (See Appendix 2 for one possible re-sequencing which would be appropriate.)

Measurement of Length Unit. Several specific comments were made with respect to the content of the Measurement of Length Unit. Among these were the need for revised instruction on the equivalence

concepts like "as close as," and the suggestion that the comparatives would more appropriately be sequenced if instruction started with long/short rather than far/near. This latter suggestion is in opposition to that made on the basis of the formative evaluation data. These data had suggested that the most appropriate (i.e., easiest) comparatives to start with would be those of distance (cf. Thurlow, Krus, Howe, Taylor, & Turnure, 1975).

The major suggestion made about the instruction in the Length Unit was a quite important one, and one which leads the Vocabulary Development Project to suggest that the commercial publication of the Unit be delayed. This suggestion was that the Unit should deal with the proposed metric system of measurement. Given that the metric system is to be adopted nationwide, the revision of the Unit to teach metric tools and units of measurement seems appropriate.

Measurement of Weight Unit. Delay in the commercial publication of the Measurement of Weight Unit also seems justified until a decision is made concerning the use of metric weights and measures. Although teachers indicated fewer problems with not having weight presented in the metric system, such a revision also seems necessary before readying the Unit for commercial publication. No specific recommendations about content or sequencing were noted by those teachers field-testing the Weight Unit.

Time with the Clock Unit. Unfortunately, instruction in the Time Unit was limited due to time restrictions. The last part of the instruction, that dealing with complex time telling skills, was never systematically evaluated. Generally, the content and sequencing

in the Unit were found to be appropriate and complete by the participating EMR classrooms. The only major content change suggested by teachers was that more instruction was needed at the end of the Unit. However, this suggestion was made by only 20% of the teachers. Ideally, the Vocabulary Development Project would recommend that the last lessons in the Unit be tested in one or two classes to determine whether additional instruction is actually needed. Additions to the instruction before commercial publication would be made on the basis of the findings from these classrooms.

General Format. The suggestions made with respect to general format were quite constant across the four units tested. The teachers were pleased with the form of the materials, and indicated that they were generally easy to use.

No problems were noted with the format of the Teacher's Edition. The Teacher's Editions, however, had been extensively revised during the pilot-tests of the various units, so that no need for revisions had been expected. However, one question had arisen with regard to the inclusion of the full scripts of the tape presentations within the Teacher's Editions. During formative evaluation, it had been suggested that it might be easier for teachers to follow the tape presentation and manipulate the picture books at the same time if the Teacher's Editions contained summaries of each tape presentation rather than the complete scripts. The following is the question used to obtain the teachers' opinions on this issue, with the numbers indicating the mean percentage of teachers selecting each option.

What do you think would be the most effective and useful way to inform the teacher of the content of the tape presentation?

100%	Complete script (i.e., as is)
0%	Summary of script
0%	No script at all

All teachers selected the first choice, the complete script, thus suggesting that no revisions to this aspect of the Teacher's Edition need be made. Of course, when commercially published, the size of the Teacher's Editions could be reduced by using smaller type and by reducing the size of accompanying pictures. The Vocabulary Development Project recommends that such revisions be made.

No general problems were noted with the use of the audio mode for presenting the instruction in the units in the Money, Measurement and Time Program. Although there were some cases in which the voices were garbled or too fast, the idea of presenting instruction on audio tape cassettes was favorably received. Only one possible general problem with the tapes was noted. The sound used to indicate to the teacher and the class that it was time to turn to the next page in the picture book was considered by some to be distracting to the children. It was suggested that a softer tone, or a bell sound, might be a solution. Such a revision seems reasonable, along with improvements in tape quality which would come with professional production of tapes.

Major revision suggestions were made with respect to the picture books which the children followed as the tape presentation was in progress. During the field-test, two forms of picture

books were used. A "Big Picture Book" was provided with the beginning book(s) of a unit. It consisted of a set of large pictures (11" x 17") which the teacher regulated for the whole classroom. The book was designed to be placed on a type of easel and situated so that all children could easily see it. Individual Children's Picture Books were used with the more advanced levels of instruction in a unit. These books were small (8 1/2" x 11") and designed to be given to each child so that he would be responsible for turning the pages, pointing to pictures, etc., on his own.

Results from the evaluation forms showed that some teachers favored the Big Picture Books, while some favored the individual student texts. When asked to respond to a specific question about their preferences, variations in responses were common. The following is the question used to obtain responses to this issue, and the mean percentage of teachers selecting each option.

How do you think the student texts should be supplied to the classroom?

12.5%	Only in the form of Big Picture Books
8.2%	Only in the form of individual Children's Picture Books
27.0%	In both forms, with both being used during the same tape presentation
23.0%	In both forms, with the teacher selecting the form to be used during a given tape presentation
29.2%	In one form for certain books and the other form for other books (i.e., as it is now)

Given the variability in answers, and the strong arguments for both types of texts, the Vocabulary Development Project would recommend that each book of instruction have both forms of picture books available for use in any classroom. In this way, the teacher

could organize instruction in the optimal way for the classroom, a way which might vary from day to day.

A major suggestion relating to the construction of the Big Picture Books was that they needed to be larger and sturdier (perhaps made of tagboard). The most overriding suggestion, however, made in regard to both Big Picture Books and individual Children's Picture Books was that they should be in color. This recommendation was made by nearly every teacher participating in the field-test. The Vocabulary Development Project would definitely recommend that this revision be made.

Another concern of the Vocabulary Development Project related to the type of testing instruments which would be necessary for placement and helpful to the teacher. In response to a question asking whether or not teacher administered assessment devices needed to be included, all teachers except a few in the two measurement units indicated that they would definitely desire the addition of tests for evaluation during the instruction. There was no overall agreement, however, as to whether these tests should be after each lesson, after each book, or after the entire unit. At present, the testing manual for each unit includes a Unit Achievement Test, in addition to the Diagnostic Placement Test. The Vocabulary Development Project would recommend that tests be developed and included at relevant points throughout the instruction (i.e., after every few lessons) to allow the teacher to assess the children's progress during the instruction and to identify weak spots in their mastery of objectives.

When asked about the need for individualizing the instruction, the majority of teachers indicated that they did not think further individualization was necessary. The use of group instruction, with activities allowing for individualization, was viewed as a positive aspect of the Program. The Vocabulary Development Project would recommend that the Program not be redesigned for individualized instruction, but that the opportunities for individualization be pointed out and made more obvious in all units.

Conclusion

The present field-test of the Money, Measurement and Time Program, along with the normative data from nonretarded children, has verified the effectiveness of the instruction for the population of educable mentally retarded individuals. Both the evaluation data and the comments of teachers participating in the feild-test indicate that the developmental versions of the materials would be extremely valuable additions to classrooms for EMR children. Clearly, the recommendations for the revision of these developmental versions are relatively minor, and ones which can easily be made before the final publication of the materials.

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Footnotes

Appreciation is extended to all school systems participating in the field-test of the Money, Measurement and Time Program, and especially to the teachers who allowed a great deal of testing and who responded willingly to requests made of them. Special thanks, of course, are due to the teachers who were part of the Vocabulary Development Project for their dedication to the task of writing and revising the units field-tested.

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Appendix 1: Overview of the Money, Measurement of Length, Measurement of Weight, and Time with the Clock Units

Table of Vocabulary Words in Money Unit

Prerequisite Concepts:

big, little (-er, -est)
large, small (-er, -est)

Book One	Book Two	Book Three	Book Four
trade	coins	trade	store, (shopping center), shopper
money	penny, nickel	penny, cent, ¢	customer, clerk
spend, save, bank	dime	nickel	pay, cash register
	quarter	change	price (cost), price tag
	half dollar	dime	cash, cash register, cashier
	bills	quarter	charge, check
	one dollar bill, five dollar bill	half dollr, fifty cent piece	change
		dollar, $	
		five dollar bill, ten dollar bill, twenty dollar bill	

Book One: Money and its Functions

This book introduces the basic concepts related to money and its functions. The presentation of the concept "trade" provides a starting point for the development of the concepts related to money.

Book Two: Recognition of Money

This book deals mainly with the recognition of the five U.S. coins and some of the U.S. bills. In addition, the book presents the relative value of the coins and bills.

Book Three: The Value of Money

This book presents the exact value of the five U.S. coins and several of the U.S. bills and deals with the relationships between them. The concepts of "trade" and "change" are also introduced to insure the fullest understanding of the value of money, and to give the children experiences in counting money and making change.

Book Four: The Store

This book presents vocabulary concepts related to the store. Several of the beginning lessons in this book may be used following Book Two to provide the children with an opportunity to apply their recognition skills in a store setting. The final lessons in the book are designed to follow Book Three, and deal with more advanced concepts of money and with making change after a purchase.

Prerequisite Concepts:

top
bottom

Book One	Book Two	Book Three
far, near, close	measure, "how long," "how tall," "how far away"	inch
closer, closest	measuring tool, ruler, yardstick, tape measure	inches
farther, farthest	foot ruler, foot	longer than an inch, shorter than an inch, ("almost an inch")
"as close as"	feet	length, height, distance
tall, short	longer than a foot, shorter than a foot, ("almost a foot")	feet and inches
taller, tallest	yardstick, yard	
shorter, shortest		
"as tall as"		
long, short		
longer, longest		
shorter, shortest		
"as long as"		

Book One: Comparativcs

This book presents the comparatives of distance, height, and length. The processes of identification, demonstration, and utilization are stressed in the instruction

Book Two: Beginning Measurement

This book deals with the vocabulary and skills involved in measuring to the nearest foot. The book presents the concepts of "measuring", "measuring tool", and "foot" unit, and teaches the use of measuring tools to measure to the foot.

Book Three: Measuring to the Inch

This book presents the concept of an "inch" and provides instruction on measuring to the nearest inch. The terms "length", "height", and "distance" are introduced and serve as a vehicle for summarizing the comparison and measurement skills presented. The Unit concludes with instruction on measuring in feet and inches.

Table of Vocabulary Words in Weight Unit

Prerequisite Concepts:

big, little (-er, -est)
easy, hard (-er, -est)

Book One	Book Two
heavy, light	scale, weigh, (weight)
heavier, heaviest	pound(s), (weight)
lighter, lightest	ounce(s)
"as heavy as" (same)	ton(s)
balance, (balancing, balanced)	

Book One: Comparatives

This book presents the comparatives of weight, stressing the process of identification and utilization. The book concludes with a lesson on the balance, which serves to review and reinforce all the concepts presented in the book.

Book Two: Measuring Weight

This book deals with the scale, the basic tool for measuring weight, and with several units of weight measurement (pound, ounce, ton). Beginning weighing skills are introduced in relation to the "pound" unit of weight.

Table of Vocabulary Words in Time with the Clock Unit

Prerequisite Concepts:

(time)
big, little

Book One	Book Two	Book Three	Book Four
light, dark	clock, face, hands	thirty	minute
day (daytime), night (nighttime)	long hand, short hand	half hour (half past)	minutes
today, tonight	o'clock	hour, half hour	minute hand, hour hand
morning, afternoon	hour	(second, second hand)	minutes after (quarter after)
early, on time, late			minutes before (quarter to)

Book One: Time without the Clock

This book presents several general terms which do not require the use of the clock. The instruction stresses language development, and is intended to make the children more aware of time at beginning descriptive levels.

Book Two: The Clock

This book provides an introduction to time telling. It presents the clock and its function, and the aspects the children must attend to in order to tell time. The book concludes with instruction in beginning time telling skills (using the word "o'clock" and showing the passage of an "hour" on the clock).

Book Three: Telling Time on the Half Hour

This book presents the concepts and skills necessary for telling time on the half hour, and also introduces the passage of one half hour on the clock.

Book Four: T ing Time to the Minute

This book is concerned with the basic terms and skills involved in more complex time telling (i.e., telling time in minutes). The instruction proceeds from telling time in minutes after the hour to telling time in minutes before the hour.

Appendix 2: One possible re-ordering of the Money Unit

The following re-ordering of the instruction in the Money Unit reflects the attempt to move all low-level store-related concepts into Book One. The more advanced store concepts are introduced later and related to counting and change-making skills.

Book One:

trade
money
spend, save, bank
store, (shopping center), shopper
customer, clerk
pay, cash register
price (cost), price tag

Book Two:

coins
penny, nickel
dime
quarter
half dollar
bills
one dollar bill, five dollar bill

Book Three:

trade
penny, cent, ¢
nickel
change
dime
quarter
half dollar, fifty cent piece
dollar, $
five dollar bill, ten dollar bill, twenty dollar bill

Book Four:

charge, check
cash, cashier
(Counting Money)
change
(Making Change)

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Center in Education of Handicapped Children

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