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JAMAICA NUTRITION EDUCATION PROJECT

FINAL EVALUATION REPORT

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INTRODUCTION

In 1984, the Jamaica Primary Nutrition Education Project was undertaken as a collaborative effort by Unesco, the Jamaica Ministry of Education, USAID and the International Nutrition Communication Service (INCS). The overall purpose of the program was to incorporate nutritional concepts and messages into innovative reading materials in order to promote reading skills while imparting nutrition knowledge to primary school students. In particular, these reading materials were introduced to and used by 4th and 5th graders in 15 pilot schools in Clarendon parish during the 1986-87 school year.

The materials utilized a "fusion methodology" (see Appendix E) that drew on techniques of formal school curriculum design, nonformal education and social marketing. Special effort was placed on producing lessons adapted and relevant to the local setting and translating technical nutrition information into concepts and messages that better prepare students to address food choices; developing a reader that is relatively self-contained from a content point of view (thereby minimizing the need for pre-service or in-service teacher training); and utilizes a variety of reading formats (comics, poems, stories, essays) thereby challenging readers with varying abilities.

This report summarizes the project evaluation study carried out by Ms. Carol Baume. The evaluation indicated that the project has accomplished a number of its objectives in a surprisingly short period of time, among them:

that student interest in the materials was very high,

that pupils in the pilot project schools made statistically significant gains in nutrition knowledge,

that students in the project schools made greater gains in reading ability than pupils in control schools,

- that children in the pilot schools made some changes in their eating habits, such as eating more vegetables and fruits, and decreasing their consumption of junk foods.

Based on the recommendations made at the final project workshop, plans are being implemented to expand the use of the manuals to all Jamaica 4th grade classes in the 1987-88 school year.

Christine Hollis
Staff Associate

The present is a report on the evaluation of the Jamaica Nutrition Education Project. The Project represents an effort to improve children's reading skills while teaching them basic nutrition concepts. Materials suitable for 4th and 5th grade students were developed and compiled into a manual entitled The Nutrition Magician, and were pilot tested in fifteen schools in Clarendon parish, Jamaica, during the 1986-87 school year.¹

A system for monitoring and evaluating the Project during the pilot phase was established to provide a means of evaluating the materials as well as of assessing the impact of the Project on reading skills, nutrition knowledge, and dietary practice. The specific evaluation component which addresses each of these areas is listed below.

For Impact Assessment:

- (1) a basic reading skills exam, administered as a pre-test and post-test to pupils in five pilot schools and in two schools used as control groups;
- (2) a curriculum-based nutrition test, administered as a pre-test and post-test in five pilot and two control schools;
- (3) a 24-hour food inventory, completed by a sample of children before and after taking the curriculum to assess behavior change with regard to nutritional habits;

For Materials Assessment:

- (4) a set of monitoring forms which systematically gathered feedback from teachers on each section of The Nutrition Magician manual.

¹ The Project is collaboratively funded by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United States Agency for International Development (USAID), which contracted with the International Nutrition Communication Service (INCS) of the Education Development Center (EDC) for technical assistance and evaluation. The Jamaica Ministry of Education managed and implemented the Project.

In addition, an evaluation conference was held toward the end of the school year, providing a forum for teachers to discuss their experience with the materials. ²

PROJECT BACKGROUND

The principal objective of the Jamaica Nutrition Education Project was to incorporate nutritional information into reading materials, thereby simultaneously developing reading skills while imparting nutrition knowledge to primary school students. The Project consisted of the introduction of a set of reading materials promoting healthy eating habits to 4th and 5th graders in fifteen pilot schools (seventeen classrooms) in Clarendon parish during the 1986-87 school year. Materials were developed during the previous year by the Ministry of Education with technical assistance from INCS, using an innovative "fusion methodology". Special effort was made to translate technical nutrition information into concepts and messages that better prepare students to make food choices in daily life, to develop a student reader that is relatively self-contained from a content point of view (thereby minimizing the need for pre-service or in-service teacher training); and to utilize a variety of reading formats (comic books, stories, essays, etc.) thereby challenging readers with varying abilities.

A Teachers' Guide which targeted lesson objectives and suggested activities was provided to participating teachers. A set of posters depicting food groups -- as "Go Foods," "Grow Foods," and "Healthy Helper Foods" -- was distributed to each class-

² The conference took place in Mandeville, Jamaica, on March 24 and 25, 1987. Participants included twenty-six teachers, Ministry of Education staff, and representatives from UNESCO, AID, and INCS.

room. Teachers were encouraged to use other existing resources on nutrition education, such as those published by UNESCO and the Caribbean Food and Nutrition Institute to support the reading materials. The intervention itself, i.e., classroom use of The Nutrition Magician primer, took place during the regularly scheduled student reading lesson.

SUMMARY OF EVALUATION FINDINGS

Overall, the evaluation found that the project was successful in stimulating pupil interest in nutrition, in teaching basic nutrition concepts and messages, in inducing the adoption of more healthful eating habits, and in strengthening basic reading skills. Some of the more notable findings are summarized here and are more fully documented in subsequent sections.

- 1) Teachers reported that student interest in and learning from the curriculum was very high, and was in many instances translated into behavior change;
- 2) The nutrition exam found that pupils in the project schools made modest (but statistically significant) gains in nutrition knowledge, while the comparison (control) group made no gain;
- 3) Reading test results suggest that students participating in the Project made greater gains relative to pupils in the control schools;
- 4) The Food Inventory analysis indicates that children made changes in their eating habits, reflected principally in an increase in "healthy helper" foods, but also in a trend toward improved breakfasts and a decrease in consumption of junk foods.

EVALUATION DESIGN

The implicit model underlying the nutritional goals of the project is one in which the intervention (reading/nutrition material) leads to knowledge change which, in turn, leads to behavior change. The evaluation was designed to look at each of these component processes and assist in determining which links in the chain functioned as planned.

Project Model:

INTERVENTION ----> KNOWLEDGE GAIN ----> BEHAVIOR CHANGE

Evaluation Components:

TEACHER MONITORING FORMS	NUTRITION EXAM	FOOD INVENTORY and TEACHER OBSERVATIONS
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Specifically, the intervention was examined through the teacher monitoring forms, which point out strengths and weaknesses of each section in the reader. Knowledge gain in nutrition was assessed by the nutrition exam, which enabled comparison of project and control groups both before pre- and post-curriculum. The 24-Hour Food Inventory served as a measure of dietary behavior change. The reading goals of the project were assessed by a basic reading skills test administered before and after each participating classroom worked with the materials.

The evaluation plan and instruments were developed in accordance with project time and financial constraints. The instruments and measures they produce should be regarded as "blunt" -- to be taken as indicative of general processes and orders of magnitude rather than as precise measures. For example, the 24-Hour Food Inventory represents an effort to find a means of gauging behavior change without

extensive surveys, fieldworker visits, and involvement in complex analysis. It lacks the sensitivity of a more elaborate investigation, but it required relatively little consultant and staff time while providing an indication of the extent to which dietary changes have been made.

The overall design of the evaluation involves comparison of pre-test and post-test scores in both project and control schools. Scores were obtained and compared in reading skills, nutrition knowledge, and dietary practice. Pre-test scores were collected in September, 1986, and post-test scores obtained in February, 1987. This means that we are looking at change over a five-month period, a short amount of time in which to induce change, particularly through an intervention which comprises only a small part of the regular curriculum. Teachers report, on average, spending one to two hours per week using the materials. Furthermore, only about 1/4 of the 70 teachers completed all of the lessons by the time the post-test was administered. While it would have been optimal to wait until the end of the school year (June) to conduct the post-test, evaluation results were needed by March, the end of the project cycle, in order to examine evidence of the project's effectiveness. Evaluation results, therefore, represent conservative estimates of the impact of the materials.

EVALUATION FINDINGS

The first part of this section summarizes evaluation data pertaining to the impact of the Project on reading skill, nutrition knowledge, and change in eating habits. The subsequent part summarizes teachers' assessment of the Project materials themselves.

IMPACT OF THE PROJECT

Testing focussed on fourth graders, since they had not had any exposure to the materials prior to the pre-test. Many of the fifth graders had covered some of the material during the previous year when their teachers were involved in developing the nutrition reader; of primary interest, therefore, are scores for fourth graders. The following table shows the number of fourth and fifth grade students tested in the Project and control schools for both the pre-test and post-test. Since these schools "stream"³ their students, classrooms tested were selected to represent a range of streams -- that is, a range of academic ability.

NUMBER OF STUDENTS TESTED BY GRADE, GROUP, AND TEST

<u>Group</u>	<u>Pre-Test</u>	<u>Post-Test</u>
Project 4th	397	417
Project 5th	106	113
Control 4th	58	52
Control 5th	<u>54</u>	<u>56</u>
TOTAL:	615	638

³ Most Jamaican primary schools "stream" their students; that is, they divide them into classes by ability. Stream 1 pupils are the fastest learners for their grade.

Reading Test

A 30-item reading exam was developed to test skills in word decoding, word recognition, and reading comprehension. The reading exam did not specifically draw upon vocabulary from the Nutrition Magician reader, but rather was based upon graded vocabulary lists provided by the Ministry of Education. Similarly, the topical content of the reading exam was of a general nature, and not nutrition-based. The following table summarizes overall reading test scores for various groups:

READING PRE-TEST AND POST-TEST SCORES

PROJECT AND CONTROL GROUP COMPARISONS

(out of 30)

<u>Group</u>	<u>Pre</u>	<u>Post</u>	<u>Gain</u>
All Project	7.8	11.1	+3.3
All Control	10.0	10.9	+0.9
Project 4th	7.0	10.6	+3.6
Control 4th	10.8	12.3	+1.5
Project 5th	10.7	12.8	+2.1
Control 5th	9.1	9.6	+0.5

WITHIN-PROJECT SCORE COMPARISONS

Project girls	8.6	12.4	+3.8
Project boys	6.9	9.5	+2.6
Project 4-1*	10.5	14.0	+3.5
Project 4>1**	4.5	8.2	+3.7
Project 5-1*	13.9	16.5	+2.6
Project 5>1**	9.3	10.3	+1.0

* stream 1

** below stream 1

While post-test reading scores are equal for the project and control groups,⁴ the pupils in the project group began the school year with lower reading scores and appear to have caught up to their counterparts in the control schools. That is to say, the data suggest that children in the pilot schools made greater gains in reading ability than did children in control schools.

⁴ See T-Test results in Appendix B.

Nutrition Knowledge Test

The nutrition exam consisted of twenty multiple-choice items. In order to minimize the effect of differential reading skill on ability to answer nutrition items, questions and their response options were read aloud one by one while pupils followed along on their written copies and circled their chosen answer as it was read.

Pre-test results show that initial level of nutrition knowledge among pupils in the project schools was identical to that of pupils in control schools. (The subgroup of 5th grade project students, however, initially scored higher than 5th grade control students, most probably because of their prior exposure to the curriculum materials.) The following table breaks down pre- and post-test nutrition scores by various groups:

NUTRITION PRE-TEST AND POST-TEST SCORES

PROJECT AND CONTROL GROUP COMPARISONS

(out of 20)

<u>Group</u>	<u>Pre</u>	<u>Post</u>	<u>Gain</u>
All Project	6.8	9.1	+2.3
All Control	6.7	6.5	0.0
Project 4th	6.4	8.9	+2.5
Control 4th	6.8	6.3	0.0
Project 5th	8.2	9.6	+1.4
Control 5th	6.6	6.6	0.0

WITHIN-PROJECT SCORE COMPARISONS

Project girls	7.2	9.8	+2.6
Project boys	6.3	8.3	+2.0
Project 4-1*	7.7	9.9	+2.2
Project 4>1**	5.4	8.2	+2.8
Project 5-1*	10.3	10.4	+0.1
Project 5>1*	7.3	9.2	+1.9

* stream 1

** below stream 1

Several observations can be made from the nutrition test data:

1. Overall, pupils who were exposed to the nutrition curriculum scored an average of 2.6 more questions correct (out of 20) than did pupils in the control schools (difference between project and control post-test scores). This is a modest but statistically significant gain.⁵

⁵ See T-Test data in Appendix B.

2. Girls tended to learn more from the curriculum than did boys.

3. Although stream 1 students achieved the highest absolute scores, those pupils below stream 1 tended to make greater gains over the five months of exposure to the curriculum than did stream 1 students.

A breakdown of nutrition scores into three content areas -- food groups, food roles, and proper food hygiene and habits -- shows the most improvement in the area of food roles (e.g., what Vitamin A does, why iron is important), although scores are difficult to interpret since less than half the students covered the last lessons which concentrated on food hygiene. It appears that the least progress was made in enabling students to classify foods into groups.

Behavior Change

In order to learn whether students had changed eating habits as a result of the curriculum, a 24-Hour Food Inventory sheet was developed. This instrument asks, by means of a checklist, for pupils to record everything they have had to eat or drink in the past 24-hour period. The checklist is grouped into breakfast, lunch, dinner, and snack foods/drinks. Since the instrument depends upon a child's recall over a 24 hour period, it is likely that it is not highly reliable, although it should give an idea of general trends in kinds of foods consumed. Three areas were targeted for analysis: quality of breakfast, balance of foods eaten, and junk food eaten.

SUMMARY OF 24-HOUR FOOD INVENTORY

	BREAKFAST			BALANCED MEAL			JUNK FOOD	N*	
	0	1	2	3	Go	Grow			HH
<u>PROJECT</u>									
Pre:	3%	37%	50%	10%	99%	95%	39%	69%	282
Post:	2%	25%	62%	12%	99%	95%	58%	60%	328
<u>CONTROL</u>									
Pre:	4%	36%	40%	20%	99%	95%	38%	65%	115
Post:	1%	32%	47%	20%	98%	96%	45%	62%	101

* The number of children comprising each pre- and post- group does not correspond precisely to the number of children tested. Stream 3 children were omitted from this exercise, as they are non-readers and had difficulty marking the form. Other forms which were obviously unreliably filled out (for example, where all foods were checked) were also excluded from the analysis.

On the basis of what a child reported eating for breakfast, the child was categorized in the following manner:

- 0 = no breakfast, or tea/coffee only
- 1 = bread or dumpling (with or without tea/coffee) only
- 2 = food from two groups consumed
- 3 = food from all three groups consumed

For analyzing to what extent children had a well-balanced diet over the course of the day, coders checked the appropriate column when a child had eaten a "Go Food," a "Grow Food," or a "Healthy Helper food," and the percentage of children having consumed at least one in a given category was calculated. A column for "junk food" was also included, so that the percentage of children having eaten at least one of these snacks could be determined.

The data suggest a moderate shift from breakfasts consisting of only tea and dumpling (the "1" category) to the addition of another food (the "2" category) to the morning meal. Teachers commented that they thought the actual improvement in quality of breakfast was greater than the data reflect, as they surmised that the actual number of children who had been coming to school without breakfast was initially much more than 3%. They also noted that after the breakfast lesson, children were impressed with the importance of starting the day with a nutritious meal and started commenting that they had eaten a good breakfast.

The most dramatic impact on eating habits appears to be the increase in consumption of "healthy helper" foods among children who were exposed to the curriculum. Prior to the nutrition lessons, 39% of the Project students reported eating fruits and vegetables, while 58% did so at the time the post-test was given. Consumption of these foods among children in the control group appears to have also risen, but by only 7% (from 38% to 45%). Teachers confirmed this trend in both their written evaluations and in discussions during the evaluation conference.

With regard to the consumption of junk food, the data show evidence of some decline in this area among pupils in the Project schools. The figures cited in the

table may hide a greater reduction in consumption, however, since many children who were eating several junk foods per day may now be eating only one, a decrease which would not be reflected in the data.

The behavioral trends suggested by the Food Inventory analysis are corroborated and brought to life by comments made by the teachers in the final evaluation form ("Overview"), which asks what impact the nutrition materials have had on the children and if there is any evidence that their eating habits have actually changed. These comments were consistently positive; they included reports of students bringing fruit to school for snacks, of children informing parents that they need to have food from all three groups, of pupils forming delegations to urge vendors to sell more healthy snacks, of children now eating foods they used to avoid (especially vegetables), and of more pupils eating in the canteen, where they can get better food than from vendors. A sample of these interesting and encouraging verbatim comments appears in Appendix A.

MATERIALS ASSESSMENT

Teacher Feedback via Monitoring Forms

Teachers were asked to provide feedback on individual lessons in the nutrition reader, rating and commenting on such issues as importance of the topic, clarity of presentation, student interest, etc. The lesson evaluation form was set up so that teachers could indicate their rating on a scale of 1 - 5 to facilitate reporting and comparison among ratings. Rating averages are presented in a table in Appendix B,

along with the evaluation forms containing the full text of the question and the rating scale.

A number of generalizations can be made from the teacher ratings. According to the teachers, all topics were appropriate and important; lessons were presented clearly; the reading and vocabulary level was somewhat low for the more advanced students; students exhibited considerable interest in the material; and the suggested activities proved to be useful pedagogical tools. Teachers also reported that while they did not need any more than the normal preparation time to present the material, they would have liked to have had additional background material in the Teachers' Guide.⁶

During the evaluation conference, teachers met to discuss ways in which the Guide could be made more useful to them. They suggested that the Guide be organized by topic and concept, with objectives of the lesson and main ideas delineated. If additional background material were included, teachers could draw upon it to upgrade the lessons for the more advanced students in their classes. Some teachers also thought it would be helpful to include additional activities and a list of resource materials on nutrition topics.

In addition to the individual lesson assessments, teachers completed a "Curriculum Overview" form (See Appendix B) after they had finished teaching the lessons. This form enabled teachers to make comparisons among topics and presentation formats. A number of teachers suggested additional topics: dental care, the digestive process,

⁶ It should be noted that one objective of the Project was to be able to introduce nutrition information into the primary school without large investments in nutrition training for teachers.

preparation of food, sources of food, and the results of malnutrition. In looking back over the lessons, a number of teachers found the lesson on anaemia less successful than the others, with some pointing to the difficulty of the concept and confusion over the term "iron," and others remarking that the print was too small.

The comic format of some of the lessons appears to have been successful in engaging the childrens' interest, especially, some teachers remarked, among the poorer readers and the boys. Teachers also thought that the fact that there was a variety of formats -- stories, poems, songs, in addition to the comics -- was an important factor in stimulating student interest.

When asked what should be done with the materials in the future, most teachers indicated that the lessons should be expanded to cover more grades, and that the Project should be extended to other schools.

A number of factors appear to have contributed to the positive results achieved by the Project. According to teachers, the nutrition magician character and theme, the diversity of presentation formats, and the use of language and pictures rooted in the local setting were important elements of appeal to the children. Certainly another factor, however, was the was the "bottom-up" approach to the development of the materials, so that teachers collaborated from the outset, retained a special interest in the Project, and remained important sources of feedback throughout the process. Furthermore, teachers were given the latitude to utilize the materials as they saw fit and to proceed at their own determined pace, a factor which, as one conference participant noted, stimulated their motivation and creativity, and reflected respect for them as professionals.

APPENDIX A

PROJECT IMPACT ON BEHAVIOR

VERBATIM COMMENTS FROM TEACHER EVALUATION FORMS

PROJECT IMPACT ON BEHAVIOR

VERBATIM COMMENTS FROM TEACHER EVALUATION FORMS

- > Children stated explicitly that they are now eating food such as vegetables and drinking milk. They have also informed their parents about the nutrition programme in the school and as a result they have been getting a better diet at home.
- > From questioning the children in the morning before discussing the lesson, children said they try to have a balanced breakfast because they don't want to be like "Micky." One can also notice that they prefer to buy an orange or ripe banana to a suck-suck, now that they realize what are "junk foods."
- > The children have been discussing with each other what they have been eating each day. So this is to say now they know the groups of foods, they are discussing with their parents what they should eat.
- > The pupils were greatly influenced by this nutrition programme. Pupils now talk about the foods that make up each food group even at lunch time as they do their purchasing. They often ask questions on the various foods they eat at break and lunch time. It helps them to start eating some of the foods they never ate, eg., cheese.
- > Some pupils have ceased eating so many sweets at break time and have started eating fruits instead. Pupils sometimes bring cheese and milk for lunch.
- > It gives them more ideas and challenges them to eat right. Most of them now know what a balanced diet is and the number of them eating at the canteen has grown significantly.
- > The children changed their lunches and snacks. If a child goes out and buys junk food, the others would laugh and say "Boy, you must not eat too much junk food." Junk food has been completely wiped out and the children are now spending their money on nutritious foods.
- > A child told me that he helped his mother to plan a balanced diet, and he no longer suffers from anaemia.
- > We get feedback at P.T.A. meetings and the sellers on the school compound report a drop in sales. On two occasions parents hinted that there was a problem at home as children were saying meals prepared were neither "Go Food," "Grow Food" or "Healthy Helpers."
- > Many of the children are now seeing the importance of eating proper meals. Many now eat at the canteen and some bring meals from their homes. Some have started small gardens.

APPENDIX B

LESSON EVALUATION RATINGS AND INSTRUMENTS

TEACHER LESSON RATINGS

Question #:	1	2	3	4	7	9	10	N
Food Groups	3.1	3.8	3.2	4.2	4.2	3.1	2.9	61
Balanced Meal	3.2	3.9	3.1	4.1	4.0	3.1	3.0	59
Junk Food	3.2	3.6	3.1	4.1	4.1	3.0	2.9	55
Anaemia	3.1	3.5	3.1	4.0	4.0	3.7	2.9	45
Breakfast	3.3	3.7	3.0	3.7	4.0	2.8	2.8	36
Vitamin A	3.2	3.7	3.0	3.9	4.0*	2.9	2.8	42
Sugar	3.1	3.5	2.7	4.0	4.4*	3.1	2.7	28
Breastfeeding	3.1*	3.6*	2.9*	4.2*	4.5*	2.9*	3.0*	17
Stages of life	3.1*	3.4*	2.9*	3.6*	4.1*	2.8*	3.0*	12
Keeping Healthy	3.0*	3.9*	3.1*	4.1*	3.8*	3.3*	2.8*	14

* Fewer than 20 teachers filled out ratings and therefore sample may be biased.

QUESTION AND SCALING KEY: Refer to Lesson Evaluation Form on the following page for the full text of the question and for scaling.

OVERVIEW

We would appreciate your completing this page as soon as you have finished teaching the Nutrition Magician manual, or by February 15--whichever comes first. The questions on this page ask you to think back over your experience using the nutrition materials this year. Your comments will be extremely useful in serving as a basis for making the materials more effective.

DATE: _____

LESSONS COMPLETED: ___all ___through _____

TEACHER: _____

GRADE: _____

SCHOOL: _____

STREAM: _____

(1) Are there any additional topics which you feel are important to include in the Nutrition Magician manual? Why?

(2) Are there any topics included in the manual which you feel should be omitted? Why?

(3) Are there any changes you would make in the sequence of topics?

(4) How would you compare the various presentation formats in the manual? In other words, how did the comic format work, versus the story format, versus the poem format?

(5) To what extent did you enjoy teaching these materials? To what extent were these new materials a burden on your teaching load?

(6) Did you find that any particular teaching methodology worked best in presenting this material? If so, please describe.

OVER

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(7) How do the Manual and Teacher's Guide compare with other nutrition resources you have used? Please describe in detail.

(8) What impact do you think the nutrition information has had on the children? Why?

(9) Do you think that any nutrition practices in the home were changed as a result of these materials? If so, can you cite specific instances?

(10) What do you think should be done with this material? What general kinds of changes would you like to see? For which grade(s) is it best suited?

OTHER COMMENTS AND SUGGESTIONS:

APPENDIX C

T-TEST DATA

CONTROL GROUP : PRE-TEST AND POST-TEST COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	* POOLED VARIANCE ESTIMATE *		* SEPARATE VARIANCE ESTIMATE *				
							T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	
RSCORE	READING SCORE												
	PRE-TEST	112	10.0089	5.382	0.509								
	POST-TEST	108	10.8889	6.133	0.590	1.30	0.173	-1.13	218	0.259	-1.13	212.14	0.260
NSCORE	NUTRITION SCORE												
	PRE-TEST	112	6.6875	2.036	0.192								
	POST-TEST	108	6.4722	2.413	0.232	1.40	0.077	0.72	218	0.475	0.71	209.27	0.476

T - T E S T

PROJECT GROUP : PRE-TEST AND POST-TEST COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	* POOLED VARIANCE ESTIMATE *		* SEPARATE VARIANCE ESTIMATE *				
							T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	
RSCORE	READING SCORE												
	PRE-TEST	503	7.7734	5.493	0.245								
	POST-TEST	530	11.0849	6.579	0.286	1.43	0.000	-8.76	1031	0.000	-8.80	1014.67	0.000
NSCORE	NUTRITION SCORE												
	PRE-TEST	503	6.7535	2.972	0.133								
	POST-TEST	530	9.0698	3.679	0.160	1.53	0.000	-11.10	1031	0.000	-11.16	1005.67	0.000

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----- T - T E S T -----

PROJECT GRADE 4 : PRE-TEST AND POST-TEST COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	* POOLED VARIANCE ESTIMATE *			* SEPARATE VARIANCE ESTIMATE *				
							T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.		
RSCORE	READING SCORE													
	PRE-TEST	397	6.9899	5.100	0.256									
	POST-TEST	417	10.6331	6.228	0.305	1.49	0.000	-9.11	812	0.000	-9.15	794.42	0.000	
NSCORE	NUTRITION SCORE													
	PRE-TEST	397	6.3728	2.690	0.135									
	POST-TEST	417	8.9185	3.671	0.180	1.86	0.000	-11.24	812	0.000	-11.32	762.64	0.000	

PRECEDING TASK REQUIRED 0.09 SECONDS CPU TIME; 2.56 SECONDS ELAPSED.

183 0 TEMPORARY
 184 0 SELECT IF (GROUP EQ 2 AND GRADE EQ 5)
 185 0 T-TEST GROUPS=TEST (0.1) / VARIABLES=RSCORE NSCORE

----- T - T E S T -----

PROJECT GRADE 5 : PRE-TEST AND POST-TEST COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	* POOLED VARIANCE ESTIMATE *			* SEPARATE VARIANCE ESTIMATE *				
							T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.		
RSCORE	READING SCORE													
	PRE-TEST	106	10.7075	5.928	0.576									
	POST-TEST	113	12.7522	7.537	0.709	1.62	0.013	-2.22	217	0.027	-2.24	210.69	0.026	
NSCORE	NUTRITION SCORE													
	PRE-TEST	106	8.1792	3.515	0.341									
	POST-TEST	113	9.6283	3.667	0.345	1.09	0.662	-2.98	217	0.003	-2.99	216.90	0.003	

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----- T - T E S T -----

POST-TEST CONTROL & PROJECT SCORE COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	* POOLED VARIANCE ESTIMATE *		* SEPARATE VARIANCE ESTIMATE *				
							T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	
RSCORE	READING SCORE												
	CONTROL	108	10.8889	6.133	0.590								
	PROJECT	530	11.0849	6.579	0.286	1.15	0.375	-0.29	636	0.775	-0.30	161.27	0.765
NSCORE	NUTRITION SCORE												
	CONTROL	108	6.4722	2.413	0.232								
	PROJECT	530	9.0679	3.679	0.160	2.32	0.000	-7.03	636	0.000	-9.21	222.30	0.000

----- T - T E S T -----

GRADE 4 POST-TEST : CONTROL & PROJECT COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	* POOLED VARIANCE ESTIMATE *		* SEPARATE VARIANCE ESTIMATE *				
							T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	
RSCORE	READING SCORE												
	CONTROL	52	12.2500	6.392	0.886								
	PROJECT	417	10.6331	6.228	0.305	1.05	0.761	1.76	467	0.079	1.72	63.68	0.089
NSCORE	NUTRITION SCORE												
	CONTROL	52	6.3077	2.331	0.323								
	PROJECT	417	8.9161	3.672	0.180	2.48	0.000	-5.00	467	0.000	-7.05	86.43	0.000

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- T - T E S T -

GRADE 5 POST-TEST : CONTROL & PROJECT COMPARISONS

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	* POOLED VARIANCE ESTIMATE *				* SEPARATE VARIANCE ESTIMATE *				
					* F VALUE *	* 2-TAIL PROB. *	* T VALUE *	* DEGREES OF FREEDOM *	* T VALUE *	* DEGREES OF FREEDOM *	* 2-TAIL PROB. *		
RSCORE	READING SCORE												
	CONTROL	56	9.6250	5.649	0.755								
	PROJECT	113	12.7522	7.537	0.709	1.78	0.019	-2.74	167	0.007	-3.02	140.98	0.003
NSCORE	NUTRITION SCORE												
	CONTROL	56	6.6250	2.498	0.334								
	PROJECT	113	9.6283	3.667	0.345	2.16	0.002	-5.52	167	0.000	-6.26	150.78	0.000

APPENDIX D

TEACHER LESSON CRITIQUES AND
TEACHER SUGGESTIONS FOR IMPROVING THE GUIDE
(FROM WORKSHOP SESSIONS)

Well Balanced Meals / No Fish

Group 1

Strengths:

1. Gives pupils a clear picture of what a well balanced meal involves.
2. Activities are appropriated allow children to use up what they have learnt and reinforces facts given.
3. Helps children to provide substitutes for food which are just as good.
4. Provides suggestion for inexpensive meal.
5. Activities encourage pupils to think about the lesson.

Suggestion for Activities :

1. Pupils plan a balanced meal.
2. Role play could be done.
3. Pupils who are non-readers illustrate a balanced meal.
4. Pupils write in their own words why they think Clives' meal was a balanced meal.

Choosing The Right Foods

Strengths:

- (1) Starts off with previous knowledge and review of previous lesson.
- (2) Link to new topic flows smoothly.
- (3) Decision with categories / food groups is very appropriate "catchy" allows children to form mental picture of what each food does.
- (4) Replition of words from previous lesson is good for reinforcing recognition.
- (5) Lesson gives specific information on results of eating foods.
- (6) Facts given are clear and concise. Do not over burden pupils.
- (7) Questions encourage critical thinking.

Group 1 Cont'd

Weakness:

Suggestions:- Games for pupils to group foods. Pupils could take the names of the food themselves.

Nutrition Magician

Strengths

1. The picture which introduces lesson is appropriate. ~~to~~
2. Vocabulary and print are appropriate to childrens ability and age group.
3. The topic is intriguing and thought provoking - Pupils interested to find out what the magic is about.
4. Material is relevant to children's experience
5. Children's interest is aroused as a preview of what the books contains has been given.
6. Scope for correlation.

Weakness - Colours could have made it even more attractive.

Suggestion for Improvement:

- (1) Further activities (more difficult) for exceptional children, could be included in follow up activities.
- (2) Colour the picture.

Additional Activities:-

1. Pupils draw Magician and label each food represented.
2. Use vocabulary in sentences.
3. Dictionary work.
4. Syllabication
5. Language Structure Several eg.:- Singular - plural.

Group2

The Junk Food Man

Strengths:- Pupils come to realize the cause of bad teeth and malnutrition.
Vocabulary within pupils experience - relevance.
Lesson short, but to the point.
Foods mentioned in the Junk food group are the actual foods children are always reaching out for.
Lesson shows rightaway the disadvantages of having Junk food. It also gives the alternatives
Poem appeal - rhyming - (comprehension)
Lesson introduces pupils to the importance of eating right. Not only the children benefit from the lesson but John as well. - Questions appropriate.

Weaknesses or Problems :- Topic lends itself to much discussions-
For more advanced pupils the reading matter could be more.

Suggestion for Improvement

Activities which could improve the lesson

Keep a mock shop. Things to sell-

Anaemia Monster: Message the lesson is intended to convey is

1. Quite clear even from the first paragraph.
2. Vocabulary enrichment.
3. Necessity to define anaemia - thourly bringing out new dimenision in the lesson.
4. Format awareness interest as most children enjoy lessons set out in comic.
5. Lends itself to dramatisation.
6. Children are made to see the necessity of getting balanced meals.
7. Lends itself to correlation in social studies - food.
8. Evaluation component present lends itself to making it easier to know if the lesson has been clearly put across.

Group 2 Cont'd

Weaknesses:

Lesson would be difficult in vocabulary for the slow readers. It is possible to cause pupils to become self conscious - if lesson is not well understood as pupils can be weak and sleepy for reasons other than anaemia.

Activities to Improve the Lesson

B R E A K F A S T

Group 3

Mickey and the dumplings

1. Strenghts: Topic was motivational,,reading about dumpling sparked their interest. Story stresses the importance of having 3 meals a day.

Never skipping the first meal of the day as some children do.

Stresses the importance of having a balanced meal in order to be fit and healthy for the days activities. Interesting and relevant to their experience.
2. Weakness/Problems; No weakness.
3. Suggestions for improvement: Pictures should be coloured in order to hold children interest, children could colour themselves
4. Additional Activities: Along with words given in vocabulary children could be asked to point out or list unfamiliar words to be added to word list. Children could write a similar story using their own words. Children could rewrite the story with different ending. After pupils recognize new words they could spot sight words in different sentences. Dramatization of story to reinforce concepts - breakfast and its importance.

Vitamin A

Strength: No real strength, children have already learned about this in other ways

Group 3 Cont'd

Weakness Problems: Information is limited. Story could be extended to provide more information.

Suggestion for Improvements: Story needs more printed matter which could bring out reinforce the importance of eating to protect our teeth, eyes etc.

Additional Activities: Children could draw fruits and vegetables which protect teeth, eyes etc. Children would make up extended cartoons to bring out the importance of using foods that are rich in Vitamin A. Dramatize scenes showing how to combine Vitamin A foods with others.

NO TEETH

Group 4

Strength

Presentation in relation to picture was good. This conveys to pupils that eating too much sweets will cause severe tooth ache and loss of teeth. The vocabulary of lesson was simple and explanatory to an extent. Through discussion children will realize that at this age their teeth are permanent and if they are not taken care of properly they will lose them. Thus enhancing proper hygienic pattern.

Weakness and Problems

They could elaborate more on lesson eg. telling them about the dentist, type of teeth (milk and permanent) introduction of tooth paste and brush, chew stick and sugar cane.

Suggestions for Improvement

More illustrations could be used to reinforce lesson. More detailed information could be given. Pupils could tell what is good for teeth eg. milk.

Additional Activities

Children could write compositions eg. A visit to the dentist.
(b) How I should care my teeth. Make up skits or cartoon portraying problems caused by lack of teeth care and eating sweets.

The Best Food For Baby

Strength

Pictures were good. Pupils were now exposed to a new format of reading material eg. comic format. Pictures were motivating. Lesson was explanatory.

Group 4 Cont'd

Weakness and Problems

Conversation between mother and a 3 months old baby is useless because the baby does not understand.

Suggestion for Improvement

The conversation could be between the mother and an older sister/brother about baby's diet.

Additional Activities

Children tell how a baby can get nutrients from the three food group eg. juices, porridge, crushed vegetables and soups.

Food and Stage of Life

Group 5

Strengths:

- (1) Importance of breast milk up to even 9 months
- (2) Add thick porridge and soft mashed foods as there are not many teeth.
- (3) Hygiene: clean cup and spoon.
- (4) Others foods to give energy and to build muscles.
- (5) Importance of eating foods from the three food groups - well balanced meals and nutritious snacks - away from home.
- (6) Try not to skip meals: stomach problems, ulcer, brain lethargy (drowsiness)
Hard worker needs more energy plus vegetables and fruits.
Quality and not quantity for older persons food at the different stages of life.

Weakness:- Baby talking.

- (a) cane-cutter looks more like a school boy.
- (b) older person need calcium in the diet.

Additional Activities:

Group pupils to prepared boil meals; skit, debated on cost.
Keeping healthy - reasons for eating Healthy Helpers

Strengths: Stating what really cause us to get sick.
Keeping food, surrounding clean and self.

Suggestion for Improvement:- Talk about immunization as a protection against diseases.

Vocabulary:- Most of the words are simple and within pupils experience
Reproduce other stories using nutrition concepts.

Teacher's Guide

Group 1

Improvements:

1. Format could be changed. Lessons could be in a lesson plan form ie. Objectives, content, concept, message, activities references re: further research could also be listed.
2. Suggested questions and activities could be listed so as to bring out different areas of reading skills eg. creativity, critical thinking, information and comprehension. Games crossword puzzles, find a word etc.
3. Improve physical structure.
4. Additional activities used in other schools could be collected and compiled and put in manual.

Improvement of Teacher's Guide

Group 2: There are many good points to the manual

- (1) Guide could be planned to cover pupils from Grades 3 - 6+
- (2) More teachers participation in the planning since the teachers in the classroom are in a better position to know the abilities and needs of the pupils they teach.
- (3) Arrangements could be made ^{to} ~~for~~ ^{Nutrition Ed.} (Make ~~it~~ compulsory Resource list at back of manual could be sent to participating schools. Literature from time to time to keep abreast with new findings.
- 44) Readings materials provided to carry out the programme should be graded according to pupils' ability levels.
- (5) Emphasis could be placed on more comic strip.
- (6) Added information could be included for pupils above average intelligence - in two cases teachers would have at their disposal more materials at a higher level than they actually need to teach.
- (7) Make more suggestions for correlation of material into other subject areas.
- (8) More opportunities for feedback. eg. Getting samples of pupils work apart from the standardised tests.

Group 3

Teacher's Guide

1. Since the guide is prescribed for teachers more information could have been added on some topics, for teachers benefit eg. No teeth.
2. No added local resource material. Resource list was irrelevant to teachers in the parish. Some of our local books could have been mentioned as relevant reading matter.
3. Teachers are being asked to subscribe to resource centres abroad - Explain.
4. The guide was expressive, could have been used even without readers for nutritional purposes. Concepts clearly presented. However additional material could have been added for teachers benefit. Evaluation activities could have been added which would ascertain what pupils learned.

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Teacher's Guide

Group 4

Strength and Weaknesses of Guide

Concepts of lesson were simple and plainly stated in guide. Guide could be developed by adding more activities eg. crossword puzzles, vocabulary, scramble words along with instructions for reinforcement of concepts taught. Concepts should be outlined according to the topics of lesson.

Guide could be more detailed eg. Guide could include Topic/Objectives/Main Ideas/Teachers' Activities/students' Activities eg. suggested topics for art and craft and additional resource material.

Songs, Poem and stories that were developed in the different could be collected and compiled and place in guide. Teachers from different schools could be asked to supply same.

Lessons from school curriculum related to nutrition could be listed eg. Grade 5. What make us go. Science.

Teacher's Guide

Group 5 Introduction: Reference to Books

1. Strengthening Guide

- (a) Could ~~some eg.~~ ^{include} suggestions for teaching aids.
- (b) Additional Activities eg. word puzzles, unscrambled words/sentences.
- (c) Additional information on topics such as 'Hurray for Vitamin A' - include other foods that gives vitamins also other kinds of vitamins.

2. Parents' Involvement

- (a) Pupils can take home information to parents.
- (b) Resource people to give talk.
- (c) Parent Teachers Association Meetings.

3. Where do we go from here

- (a) More stories could be reproduced with emphasis on nutrition concepts.
- (b) Preparation of Balanced Meals at school eg. Breakfast and Lunch with the help of pupils.
- (c) Pupils could make their own Readers.
- (d) Teacher and pupils could make up Reading materials - composition and poem.

APPENDIX E

FUSION METHODOLOGY:

A NEW APPROACH TO PRIMARY SCHOOL EDUCATION IN DEVELOPING COUNTRIES

FUSION METHODOLOGY:
A NEW APPROACH TO PRIMARY SCHOOL EDUCATION IN DEVELOPING COUNTRIES

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In many primary school classrooms in developing countries, educational conditions are less than optimal. Teacher/student ratios are often 1/50, 1/60, and more; several grades often are taught by one teacher who may be inadequately trained. Lighting often is inadequate, furniture insufficient, and noise levels intolerable. Needless to say there is a premium on textbooks or educational materials of any kind.

While the emphasis in this setting must be on basic education (reading, writing, mathematics), primary school also often is the only opportunity the educational system has to reach many students with functional knowledge to help them deal with their environment. The methodology described below began as an attempt to improve the efficiency of learning in primary schools in developing countries. It also evolved from a desire to develop primary school learning materials which can be used to improve reading skills while at the same time strengthen students knowledge, understanding, and practice in nutrition, health, agriculture, etc. In order to effectively accomplish these goals, materials had to (a.) meet the needs of students with differing reading abilities, and (b.) communicate messages and concepts in a readily understandable and engaging fashion.

Key elements in fusion methodology include:

- o The use of reading materials to also teach concepts and messages in technical subjects such as health, nutrition, et. al.;
- o The use of practical life problems to illustrate technical concepts;
- o The blend of formal, nonformal, and market research development techniques

edc to create engaging relevant problem-focused materials;

- o The use of different reading formats (poems, comic books, essays) to challenge readers of varying ability;
- o The teaching of both focused behavioral messages for all students and abstract technical concepts for more advanced learners.

Fusion methodology has been developed in response to: the need to create relatively self-contained learning efficient materials that minimize the need for teacher training; the need to address basic education priorities while at the same time strengthening the ability of students to address real-life environmental problems; and the need to decentralize (and make more locally relevant) the process of curriculum design and educational materials development.

The methodology was successfully tested in the recently completed Jamaica Primary School Nutrition Project. The three year (1984-1987) project developed a primary school primer (The Nutrition Magician) that successfully strengthened student reading abilities while at the same time improving their nutrition related knowledge, skills and behavior. Teachers used the primer, a collection of stories, poems, comic strips, and essays, during their regular reading period. In many classes teachers and students developed posters and other support materials. The reader also contained suggested in-school and community activities for students to carry out. The project evaluation found that in the fifteen pilot schools:

- 1.) students participating in the Project made greater reading gains relative to pupils in control schools; results also suggest that the slowest readers made the greatest gains in reading skills;
- 2.) A nutrition exam found that pupils in the Project schools made modest (but statistically significant) gains in nutrition knowledge, while the comparison (control) group made no gain;
- 3.) There is evidence that children made changes in their eating habits,

reflected principally in an increase in consumption of fruits and vegetables, but also in a trend toward improved breakfasts and a decrease in consumption of junk foods.

The success of the project is also reflected by the Jamaica Ministry of Education's recent decision to distribute the project materials (student reader and teacher's guide) throughout the country.

Fusion methodology is based on the following considerations:

- o Community input is desirable into the development of formal school materials: This principle, long applied in the field of non-formal education, is relatively innovative within the context of the formal school system. Community, particular parent and student, participation is essential if materials are to be locally relevant and engaging. Communities can provide information about target area environmental conditions, beliefs, expressions and visual images that can provide the basis for story content and illustrations. Curriculum developers become a channel for blending the expertise of technical experts with real life community concerns.
- o Materials also need to be developed in collaboration with teachers who will use them: Getting input from target group teachers into the materials design process is one of the best ways to ensure that the materials will be effectively used in the classroom. Understanding relevant teacher knowledge, attitudes and practices can help ensure that concepts and messages are teacher-friendly in their expression.
- o Teachers should be allowed to use the materials at their own pace: Because students vary in their reading ability, teachers must retain the flexibility to pace the use of fusion materials to classroom reality. Classrooms with a large preponderance of slow readers may focus on word recognition tasks, while others may concentrate on sentence structure, comprehension, and creative insight.
- o Reading materials should be designed that address real-life problems

with relevant concepts and messages expressed through reading formats that engage student interest and attention: On the reading side, fusion materials seek to provide, in a single primer, a variety of printed formats (e.g. comic book, poem, story, essay). In this way both slow and advanced readers can be challenge and individual students can progress through varying levels of difficulty. On the substantive side, fusion materials contain both messages and concepts. Messages are specific behaviors recommended as a way of addressing the real-life problems of students, their peers or families (e.g. "eat fruit as a snack instead of junk food!") Concepts are abstract principles that guide students in an understanding of their environment (e.g. "people need to eat different foods at different stages of the life cycle"). The inclusion of both messages and concepts allows materials to be of immediate relevance to all, while at the same time stimulating the intellectual development of more advanced students.

- o Extensive audience research and materials pre-testing of students, teachers, and community members ensures that materials are as self-contained as possible: Most attempts to introduce practical life education into primary schools operate on the trickle-down principle--through curricula intended for use at pre-service teacher training colleges, students eventually will receive needed information. In practice , given basic education priorities and the enormous administrative and counseling demands placed upon developing country teachers, the trickle-down principle rarely works. Fusion methodology uses audience research techniques to extensively pre-test, and thus ensure that materials are relevant, engaging, and adequately convey intended concepts and messages.

Based on the success of the "Nutrition Magician Pilot Project," fusion methodology deserves further application. Its approach to primary school materials development holds great promise for improving educational efficiency in developing countries.