

An Evaluation of the Student Performance and Perception of the Food and Nutrition Subject in the Elementary School Curriculum in Incheon, Korea

by
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실과의 식품영양 단원에 관한 교사 학생의 인지 및 학생의 지식, 태도, 기능간의 상관연구 — 인천직할시 공립국민학교를 중심으로 —

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본 연구는 국민학교 실과 과목의 식품 영양 단원에 관한 교사, 학생의 인지 및 학생의 지식, 태도, 기능 평가를 위하여 71개 인천시내 공립 국민학교 4, 5, 6학년 교사 510명과 12개교 학생 1,754명을 대상으로 설문조사를 통한 내용을 분석한 것으로 연구의 목적은 1) 실과의 정해진 교육 목표에 관한 교사의 인지정도 규명 2) 식품, 영양 단원에서 교사가 중요하다고 인지하는 내용과 가르치기에 어려움을 느끼는 내용 규명, 3) 교사가 인지하는 식품영양 단원 학습을 증진하기 위한 요소 4) 학생들이 흥미를 느끼는 내용, 5) 본 단원 학습 후 학생의 지식, 태도, 기능 정도, 6) 지식, 태도 기능간의 상호 상관관계 규명 등이며 그 연구결과는 다음과 같다.

1. 교사들이 인지하는 실과의 정해진 교육목표는 거의 모두가 중요한 것으로 나타났다.
2. 교사들이 인지하는 식품 영양 단원의 중요한 내용은 영양과 질병과의 관계, 식품위생, 식품저장 등이며, 가장 중요하지 않은 내용으로는 영양 필요량이었다. 또한, 지도에 어려움을 느끼는 내용은 영양 필요량, 조리준비, 식품구성/함유량 등이며 어려움을 느끼지 않는 내용은 영양과 질병과의 관계, 식품위생, 식품저장 등이었다.
3. 교사가 인지하는 단원 학습 증진을 위한 긍정적 요소는 적합한 실습설비와 자료, 시청각 자료등이었고 부정적 요소는 남교사, 실험 실습이 필요한 부분은 숙제로 미루는 것 등이었다.

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4. 학생들이 흥미를 느끼는 내용으로는 간단한 음식 만들기, 영양소의 기능, 영양문제 등이었고, 주스나 차 준비, 조리연료, 부엌 용구 사용법 등은 흥미를 느끼지 못하는 내용이었다.

5. 학생의 학업성취 중 지식은 4학년이 식품위생, 기초식품군이, 5학년은 알맞은 조리용구, 조리 원리, 6학년은 여가활용의 뜻, 올바른 예절 등이 90% 이상 바르게 답하였고 5학년의 삶은 달걀의 화학적 변화, 감자의 주된 영양 등은 60% 이하였다.

6. 태도 테스트 결과는 5학년이 4, 6학년보다 약간 높은 정도($M_n=3.653$)였으나 기능테스트에서는 4학년이 5, 6학년보다 약간 낮게($M_n=3.0$) 나타났다(구체적인 것은 본문 참조).

7. 4, 5, 6학년 모두 지식, 태도, 기능 간에 정적 상관을 나타내었는데 특히 태도와 기능 사이에는 4학년 $r=.7166$, 5학년 $r=.5175$, 6학년 $r=.6796$ 을 나타내었고, 지식과 태도(4학년 $r=.1546$, 5학년 $r=.0872$, 6학년 $r=.2192$)와 지식과 기능사이에서는 (4학년 $r=.1631$, 5학년 $r=.0585$, 6학년 $r=.2521$) 태도와 기능간보다 약한 상관관계를 보였다.

INTRODUCTION

Broadly defined, evaluation is the systematic process of judging the worth, desirability, effectiveness of something according to some definite criteria and purposes (Cueno, 1987). The concept of evaluation had changed more recently. For Stufflebeam and Shinkfield (1986), the purpose of evaluation is to improve, not to prove.

UNESCO declared in 1988 that the nutrition curriculum is designed to encourage learners to develop skills in critical thinking, wise decision-making and problem solving rather than to encourage the memorization of facts. In addition, there was a recognition that nutrition education must result in more than cognitive learning. Fostering desirable attitudes and values towards nutrition, as well as healthful eating practices must be emphasized.

In Korea, nutrition education in the elementary schools began in 1945. Since 1969, Homemaking subject has been taught to male and female students in the elementary school curriculum (2 hours for Grade 4, and 3 hours for Grades 5 and 6) up to 1983. From 1983 the contents of Practical Arts and Homemaking changed more on relevant practical life.

Some evaluation studies have been undertaken in Korea. Kim (1986) stated that the Practical Arts and Homemaking course which includes food and nu-

trition aims to develop personal characteristics and good attitudes/values through wide and deep practical and experimental experiences by utilizing as teaching strategies actual practice in the field and household practice for practical learning. Nutritional knowledge and food habits of various groups were the concern of several surveys conducted in Korea. Paik(1990) used a questionnaire to identify the nutritional knowledge and food habits among 369 male and female elementary school teachers from Kangwon-do who participated in an in-service training course. Preschool teachers from Wolsan, Kyung-sangbuk-do were the subjects of Choi's (1982) study on nutritional knowledge and attitudes. Kim (1984) conducted a similar study on the nutritional knowledge and food habits of undergraduate students while Jung and Kim (1985) identified the nutritional knowledge and food habits of Korean housewives. The latter study was used for the nutrition education of housewives. Kim and Kim (1989) identified various issues in dietary patterns and nutritional status as influenced by economic changes in Korea while Song's (1986) study focused on the factors which influence the patterns of nutritional knowledge and food habits among undergraduates taking a food and nutrition course.

This study specifically sought to answer the following objectives: (1) to determine if there are differences in the perception of grades 4, 5, and 6

teachers on the importance and difficulty of teaching food and nutrition; (2) to determine the perception of teachers to how the teaching of food and nutrition subject can be improved in the elementary school curriculum; (3) to determine what topics on food and nutrition are interesting to grades 4, 5, and 6 students; (4) to identify the students' performance in knowledge, attitudes and skills on food and nutrition subject; (5) to assess the extent to which the performance of grades 4, 5, and 6 students meets the requirements of the MOE(Ministry of Education) and the expectations of teachers.

METHODOLOGY

This study used survey method. The sample subjects were 1,754 male and female student respondents from 12 schools and 510 teachers included 180 advisers who were teaching food and nutrition in grades 4, 5, and 6 from 71 schools out of 95

public elementary schools in Incheon city. Two sets of questionnaires were used for the sampled teachers and students. The research instruments for teachers included the followings; personal data, content of subject matter, and open ended questions about problems and suggestions on the food and nutrition subject in the elementary school curriculum. The questionnaire for the students included the followings; personal data, content of subject matter, student's attitudes and skills, and level of knowledge on food and nutrition subject. There were also open ended questions about opinions or suggestions to improve learning abilities of students on the food and nutrition subject of the school curriculum. All of knowledge items used were derived from the Teaching Guide Book (TGB) published by the Ministry of Education (MOE). The items for attitudes and skills included two items taken from the five objectives suggested by the TGB on Practical Arts and Homemaking. All instruments were pretested.

Table 1. Teachers' Preception of Some Specific Aspects in Teaching Practical Arts and Homemaking Course in Grades 4, 5, and 6

Specific Aspects in Practical Arts and Homemaking Course	Mean		
	Grade 4 (N=170)	Grade 5 (N=178)	Grade 6 (N=162)
1 Cooperate and consider co-workers	4.541	4.472	4.599
2 Learn to be patient and finish work completely	4.535	4.539	4.494
3 Foster attitude and interest towards work	4.476	4.528	4.457
4 Have a sense of accomplishment	4.376	4.343	4.352
5 Feel a sense of achievement thru accomplishing something	4.335	4.399	4.420
6 Improve attitude for savings	4.259	4.107	4.204
7 Foster ability in planning and implementation	4.235	4.236	4.241
8 Foster scientific attitude towards work	4.188	4.281	4.179
9 Foster ability in marketing properly	4.165	4.197	4.191
10 Develop oneself	4.147	4.219	4.309
11 Learn the skill to use existing resources	4.112	4.073	4.142
12 Know the condition of family and society	4.018	3.972	4.056
13 Learn skills-	3.924	3.871	3.969
14 Learn basic theories and knowledge	3.476	3.472	3.525

A Five-Point Scale was used for Mean:

- (1) Never Important (2) Not Important (3) Fair (4) Important (5) Very Important

Table 2. Teachers' Perception on the Importance of Subject Matter in Food and Nutrition in Grades 4, 5, and 6 (N=510)

Specific Subject Area in Food and Nutrition	Not				Very		sd
	Important(%)		Fair (%)		Important(%)		
	(1)	(2)	(3)	(4)	(5)	Mean(5pts.)	
(1) Relationship between Nutrition & Disease		4.1	11.2	30.4	54.3	4.349	.836
(2) Food Sanitation		2.2	16.9	30.0	51.0	4.298	.823
(3) Food Preservation	0.4	4.7	22.4	41.4	31.2	3.982	.872
(4) Nutritional Problem	0.4	4.1	29.2	30.6	25.7	3.871	.857
(5) Food Selection/Meal Planning	0.2	6.7	28.0	37.6	27.5	3.855	.905
(6) Function of Food/Nutrients	0.4	6.1	32.2	34.7	26.7	3.812	.913
(7) Food Storage/Marketing	0.8	11.8	35.1	34.1	18.2	3.573	.945
(8) Food Preparation/Cooking	0.6	10.0	38.0	36.5	14.9	3.551	.884
(9) Food Composition/Classification	0.2	10.8	9.6	35.3	14.1	3.524	.872
(10) Nutrients Requirement/Food Needs	1.0	15.3	37.8	31.0	14.9	3.435	.954

RESULTS

Perception of Teachers and Students

1. Teachers' Perception of Some Specific Aspects in Teaching Practical Arts and Homemaking Course

Some aspects in teaching Practical Arts and Homemaking(PAH) courses were analyzed by the teachers. A five-point scale was used to indicate the relative importance of the statements. As shown in Table 1, grades 4, 5, and 6 teachers considered these three more important than others: cooperate and consider co-workers, learning to be patient and finish work completely and foster attitudes and interest towards work. The least important were learning basic theories and knowledge, learning skills, and know the condition of family and society. Teachers' perceptions of some aspects in teaching PAH courses were almost the same for the three grade levels.

2. Teachers' Perception on the Importance of Subject Matter in Foods and Nutrition

For all three grade levels, the most important subject matter areas were relationship between nutrition and disease, food sanitation, and food preservation while nutrients requirement/food needs was the least important. Nutrient requirement/food needs had the

largest sd ($x=.954$) among the ten subject matter areas while food sanitation had the smallest sd ($x=.823$) as shown in Table 2.

3. Teachers' Perception on the Difficulty of Subject Matter in Food and Nutrition

Teachers' perceptions on difficulty of subject matter in food and nutrition were almost the same for the three grade levels (Table abridged).

The most difficult subject matter were nutrients requirement/food needs, food composition/classification, while the easiest were food preservation, food sanitation, and relationship between nutrition and disease. Relationship between nutrition and disease had the largest sd (1.051) while function of food/nutrients had the smallest sd (.903) as shown in Table 3.

4. Teachers' Perception of Factors to Improve Food and Nutrition Subject

The teachers identified nine factors to improve the food and nutrition subject in the elementary school curriculum (Table 4). The most frequently cited were adequacy of resources and facilities (36.1%) and audio visual teaching materials (16.9%). Other factors mentioned were increased time allotment (4.7%), selection of contents related to new trends/topics interesting to student (9.0%), and decrease in class size specially for laboratory (3.5%).

Table 3. Teachers' Perception on the Difficulty of Subject Matter on Food and Nutrition in Grades 4, 5, and 6 (N=510)

Defficulty of Subject Matter on Food and Nutrition	Very		Fair(%) Easy			Very	
	Difficult	Difficult	Fair(%)	Easy	Easy (5-pts scale)	Mean	sd
	(1)	(2)	(3)	(4)	(5)		
(1) Food Preservation	1.4	13.1	34.5	37.8	13.1	3.482	.927
(2) Food Sanitation	1.8	13.3	34.5	36.1	14.3	3.478	.954
(3) Relationship between Nutrition & Disease	2.7	17.8	31.2	31.4	16.9	3.418	1.051
(4) Function of Food/Nutrients	2.2	17.1	40.6	27.3	12.9	3.318	.974
(5) Food Selection/Meal Planning	3.3	16.5	39.0	33.5	7.6	3.257	.935
(6) Nutritional Problem	1.0	19.8	41.2	29.4	8.6	3.249	.903
(7) Food Storage/Marketing	4.7	17.3	38.6	29.2	10.2	3.229	1.005
(8) Food Composition/Classification	2.9	21.0	40.2	29.4	6.5	3.155	.926
(9) Food Preparation/Cooking	5.7	21.6	35.1	28.6	9.0	3.137	1.036
(10) Nutrients Requirement/Food Needs	7.5	27.5	34.3	24.7	6.1	2.945	1.030

Table 4. Factors to Imporve Food and Nutrition Subject (N=510)

Rank	Grade 4	Grade 5	Grade 6	Average (%)
1 Adequate Facilities and Equipment	32.4	37.6	38.3	36.1
2 Enough Audio Vidual Materials	14.7	17.4	18.5	16.9
3 Select Contents related with New Trends/Interesting Topics	5.9	9.0	12.3	9.0
4 Increase Time Allotment	5.3	7.9	0.6	4.7
5 Decrease Class Size specially for Lab. Class	6.5	3.9		3.5
6 Resource Person, Cooperation between Teachers and Parents	2.4	5.1	3.1	3.5
7 Adequate Curriculum for Location	2.4	0.6	3.7	2.2
8 Give Homework which Needs Experiment/Practice	2.9	2.2	0.6	2.0
9 Male Teacher's Difficulty in Teaching Food & Nutrition Subject	1.2	1.7	0.6	1.2
No Answer	26.5	14.6	22.2	21.0

5. Students' Perception on Interesting Topics in Food and Nutrition

The students listed 20 topics on food and nutrition subject in the elementary school curriculum which they considered interesting (Table 5). The two most interesting topics were simple and delicious cooking (13.1%), and function of food/nutrients (10.0%). The most interesting topics varied somewhat from one grade level to another. For grade 4, the first two were function of food/nutrients (13.9%) and the food sanitation (6.5%) but for grade 5, the most interesting topics were simple and delicious cooking

(14.4%), and function of food/nutrients (9.7%) and food composition/classification (9.7%). For grade 6, the most interesting topics were simple and delicious cooking (19.0%) and nutritional problems(7.6%)

Student Performance

1. Student Performacne in Knowledge Test

Student's knowledge was evaluated using a 10-item questionnaire. The items as a standardized test were chosen from five chapters in the text vook and the Teaching Guide Book. A preliminary test for

Table 5. Interesting Topics on Food and Nutrition for Grades 4, 5, and 6 Students (N=1,754)

Rank Topics	Grade 4	Grade 5	Grade 6	Average (%)
1 Simple and Delicious Cooking	5.8	14.4	19.0	13.1
2 Function of Food/Nutrients	13.9	9.7	6.6	10.0
3 Nutritional Problems	3.4	4.8	7.6	5.3
4 Food Composition/Classification	2.2	9.7	3.0	5.0
5 Nutrients Requirement/food Needs	5.8	0.5	5.2	3.9
6 Food Sanitation	6.5	2.1	3.0	3.9
7 Food Selection	2.1	7.3	1.0	3.4
8 Food Preservation	0.3	5.4	2.5	2.7
9 General Manners	1.4		5.2	2.2
10 Food Storage/Marketing	1.4	0.5	3.9	1.9
11 How to use Measuring Tools	0.2	5.5		1.9
12 Preparation Fruits	2.6		1.0	1.2
13 Nutritional Changes during Cooking	0.3	1.7	0.3	0.8
14 Relationship between Nutrients and Disease	0.7	0.1	0.8	0.6
15 Meal Planning	0.9	0.3	0.3	0.5
16 Wash Plates After Eating	1.5			0.5
17 How to use Kitchen tools Properly	0.7	0.9		0.5
18 How to use Cooking Fuel		0.9		0.3
19 Leading Recreation Games			0.8	0.3
20 Preparation Tea/Juice	0.5			0.2
No Answer	49.7	36.2	39.6	41.8

Table 6. Performance of Grade 4 Students in Knowledge Test (N=582)

Chapter		Items	Correct Answer (%)	Wrong Answer (%)
Question	No.			
1	Q.10	Needed nutrients for growth	83.7	16.3
	11	Function of nutrients	63.6	36.4
2	12	Basic food groups	93.1	6.9
	13	Nutritional concept for children	94.3	5.7
3	14	Nutritional knowledge (food sanitation)	89.5	10.5
	15	Food sanitation	96.9	3.1
4	16	Food preparation	88.7	11.3
	17	Food practice	88.8	11.2
5	18	Knowledge of dietary practice	84.9	15.1
	19	Knowledge of dietary skills	79.2	20.8
mean			86.3	13.7

item analysis was conducted to determine the validity of items in the questionnaire. In grade 4, the item answered correctly by most of students was on food

sanitation (96.9%) while the item answered least was on function of nutrients (63.6%). However, all questions were answered correctly by more than 60

% of the students (Table 6).

In grade 5, the item answered correctly by most of the students was kitchen tools (96.9%) while the

lowest was on chemical changes in boiled egg (50.3%). However, all questions were answered correctly by more than 50 percent of the students (Table 7).

Table 7. Performance of Grade 5 Students in Knowledge Test (N=578)

Chapter Question	No.	Items	Correct Answer (%)	Wrong Answer (%)
1	Q.10	Concept of cooking	92.6	7.4
	11	Appropriate material for apron	84.6	15.4
2	12	Kitchen tools	96.9	3.1
	13	Measuring methods	90.0	10.0
3	14	Proper use of cooking fuel	85.6	14.4
	15	Knowledge on fire size of fuel	84.9	15.1
4	16	Distinguish fresh foods from stale foods	86.7	13.3
	17	Market planning	91.9	8.1
5	18	Chemical changes in boiled egg	50.3	49.7
	19	Identifying nutritive value of potato	58.1	41.9
mean			82.2	17.8

In grade 6, the item answered correctly by most of the students was concept of recreation (94.3%) while the lowest was on proper service of tea (63.6%). However, all questions were answered correctly by more than 60% of the students (Table 8).

2. Student Performance in Attitudinal Test

Students' attitudes were evaluated using a 10-item questionnaire. The items were based on five chapters in the text book and Teaching Guide Book. The items were chosen through preliminary study

for keep higher reliability and validity.

Grade 4 students had the most positive attitude toward the following items: washing fruits/vegetables before eating (x=4.143), trying to observe proper manners (x=3.797) and washing hands before eating (x=3.710). On the other hand, students had the least positive attitude toward the following items like to arrange plates/cups (x=2.720), think about nutritional value of food (x=2.739), and like to wash plate/spoon after eating (x=2.816).

Table 8. Performance of Grade 6 Students in Knowledge Test (N=594)

Chapter Question	No.	Items	Correct Answer (%)	Wrong Answer (%)
1	Q.10	Appropriate contents of an invitation card	85.0	15.0
	11	How to send invitation card	88.4	11.6
2	12	Invitation plan	89.1	10.9
	13	Proper way of serving tea	63.6	36.4
3	14	Concept of proper manners	91.9	8.1
	15	Proper manners	80.1	19.9
	16	Concept of recreation	94.3	5.7
5	17	Necessity of recreation	87.5	12.5
	18	practice of food preparation	74.6	25.4
	19	Food combination	84.7	15.3
mean			83.9	16.1

Table 9. Performance of Grade 4 Students in Attitudinal Test (N=582)

Chapter and Question No.	Items	Strongly Disagree				Strongly Agree		5-point Mean	sd
		(1)	(2)	(3)	(4)	(5)			
1	Q.9-1 Try to eat 3 meals on time everyday	6.4	17.0	34.4	25.1	17.2	3.297	1.130	
	2 Try to eat adequate amounts of food.	6.0	22.7	34.4	25.4	11.5	3.137	1.079	
2	3 Try to eat all basic food groups.	7.9	23.7	34.9	23.7	9.8	3.038	1.088	
	4 Think about nutritional value of food.	17.7	31.4	21.5	18.0	11.3	2.739	1.261	
3	5 Wash fruits/vegetables before eating.	3.1	7.2	18.9	13.9	56.9	4.143	1.143	
	6 Wash hands before eating.	3.8	13.6	25.3	22.7	34.7	3.710	1.184	
4	7 Like to prepare tea/fruits for others.	15.5	20.6	20.6	19.2	24.1	3.158	1.399	
	8 Try to observe proper manners.	2.4	10.5	27.3	24.6	35.2	3.797	1.106	
5	9 Like to wash plate/spoon after eating.	25.8	19.9	18.0	19.4	16.8	2.816	1.438	
	10 Like to arrange plates/cups.	23.5	26.3	20.1	14.8	15.3	2.720	1.374	
mean							3.256	1.220	

As shown in Table 9, the item "like to wash plate/spoon after eating" had the highest sd (1.438) while "try to eat adequate amounts of food" (1.079) had the lowest sd.

Grade 5 students had the most positive attitude toward these items whenever I cook, I do my best ($x=4.540$), read expiration date of foods before they buy ($x=4.516$) and read direction before using appliances ($x=4.474$). On the other hand, students had the

least positive attitude toward these items: differentiating fresh food from stale foods ($x=2.542$), often cooking boiled potato and egg ($x=2.597$), and weighing foods before buying ($x=2.663$).

As shown in Table 10 the item "like to cook boiled potato and egg often" had the highest sd (1.230) while "whenever I cook, I do my best" had the lowest sd (.863).

Table 10. Performance of Grade 5 Students in Attitudinal Test (N=578)

Chapter and Question No.	Items	Strongly Disagree				Strongly Agree		5-point Mean	sd
		(1)	(2)	(3)	(4)	(5)			
1	Q.9-1 Proper grooming for cooking.	2.4	9.2	31.5	22.0	34.9	3.779	1.096	
	2 Whenever I cook, I do my best.	0.7	3.3	10.7	11.9	73.4	4.540	.863	
2	3 Weigh foods before buying.	16.4	32.7	28.2	13.5	9.2	2.663	1.172	
	4 Use measuring cup/spoons for cooking.	11.2	32.4	22.7	20.8	13.0	2.919	1.223	
3	5 Check safety of gas range before using.	1.6	6.6	13.5	11.6	66.8	4.355	1.040	
	6 Read direction before using appliances.	1.2	3.6	11.8	13.3	70.1	4.474	.922	
4	7 Read expiration date of foods before buying.	1.0	4.7	9.5	11.2	73.5	4.516	.920	
	8 Identify fresh food from stale foods.	21.3	30.1	27.7	15.1	5.9	2.542	1.153	
5	9 Often cook boiled potato & egg.	20.1	34.3	20.9	15.4	9.3	2.597	1.230	
	10 Prefer egg & potato; rich nutrients.	2.8	6.2	18.2	19.9	52.9	4.140	1.092	
mean							3.653	1.071	

Table 11. Performance of Grade 6 Students in Attitudinal Test (N=594)

Chapter and Question No.	Items	Strongly Disagree				Strongly Agree			
		(1)	(2)	(3)	(4)	(5)	Mean	sd	
1	Q.9-1 Planning for a Tea party.	13.0	29.8	33.5	16.0	7.7	2.758	1.109	
	2 Like to make invitation cards.	18.2	28.1	20.9	17.8	15.0	2.833	1.327	
2	3 Welcome visitors to my house.	3.5	10.1	25.9	19.2	41.2	3.845	1.171	
	4 Like to talk to our visitors.	7.4	25.9	23.1	22.4	21.2	3.241	1.254	
3	5 Like to attend a party w/friends.	5.1	11.8	20.4	18.5	44.3	3.852	1.246	
	6 Thank God & my parents before eating.	5.9	20.9	35.4	20.0	17.8	3.231	1.144	
4	7 Enjoy singing/playing games w/others.	9.3	18.5	19.9	15.7	36.7	3.520	1.383	
	8 Want to be in good mood in a party.	8.1	21.0	31.3	21.2	18.4	3.207	1.200	
5	9 Like to make Kyung-dan/Hwache at home.	14.6	18.2	16.8	16.7	33.7	3.365	1.467	
	10 Like to set the table for a Tea party.	15.5	20.2	25.4	18.2	20.7	3.084	1.352	
mean							3.294	1.265	

Grade 6 students had the most positive attitude toward the following items: like to attend a party with friends ($x=3.852$), welcome visitors to my house ($x=3.845$) and enjoy singing/playing games with others ($x=3.520$). On the other hand, students had the least positive attitude toward the items on planning for a tea party ($x=2.758$) and like to make invitation cards ($x=2.833$). As shown in Table 11 the item "like to make kyung-dan/hwache at home" had

the highest sd (1.467) while "planning for a tea party" had the lowest sd (1.109).

3. Student Performance in Skills Test

The skills of the students were evaluated using a 10-item questionnaire. All the items were based on five chapters in the text book and the Teaching Guided Book. A preliminary test for item analysis was conducted to determine the validity of items in the questionnaire.

Table 12. Performance of Grade 4 Students in Skills Test (N=582)

Chapter and Question No.	Items	Strongly Disagree				Strongly Agree			
		(1)	(2)	(3)	(4)	(5)	Mean	sd	
1	Q.9-1 Make nutritional fuction chart.	42.8	28.7	18.7	7.4	2.4	1.979	1.062	
	2 Display a chart on weight & height.	40.2	20.4	17.2	10.5	11.7	2.330	1.393	
2	3 Serve proper foods during meals.	24.2	19.1	28.0	13.9	14.8	2.759	1.355	
	4 Choose proper foods for ingredients.	17.7	21.8	25.4	18.9	16.2	2.940	1.327	
3	5 Wash fresh fruits/vegetables properly.	4.1	7.9	19.8	18.7	49.5	4.015	1.176	
	6 Store the leftover food properly.	11.0	18.9	26.1	23.7	20.3	3.234	1.275	
4	7 Prepare tea/fruits properly.	9.1	16.5	23.0	18.4	33.0	3.497	1.338	
	8 Serve tea/fruits to visitors properly.	5.7	11.9	24.2	20.4	37.8	3.729	1.238	
5	9 Wash plates/spoons after eating.	26.8	22.9	25.1	16.2	9.1	2.579	1.285	
	10 Separate & threw wet/dry garbage.	15.6	24.1	27.5	16.5	16.3	2.938	1.297	
mean							3.000	1.275	

Table 13. Performance of Grade 5 Students in Skills Test (N=578)

Chapter and Question	No.	Items	Strongly				Strongly		
			Disagree	Disagree	Fair	Agree	Agree	5-point	
			(1)	(2)	(3)	(4)	(5)	Mean	sd
1	Q.9-11	Wear apron before cooking.	34.8	25.6	21.6	6.9	11.1	2.339	1.314
	12	Try my best when I cook foods.	1.9	6.9	24.2	19.2	47.8	4.040	1.081
2	13	Know the weight of potato, egg, etc.	32.2	41.2	18.2	6.2	2.2	2.052	.977
	14	Know how to use measuring tools.	14.5	24.4	32.9	18.7	9.5	2.843	1.171
3	15	Use cooking tools properly.	4.2	14.7	34.6	25.6	20.9	3.445	1.100
	16	Know how to use gas range/stove.	4.3	11.8	28.5	25.3	30.1	3.651	1.152
4	17	Choose fresh egg & potato.	11.2	19.6	32.0	21.6	15.6	3.107	1.215
	18	Cook proper quantity of food.	14.9	24.2	27.7	19.9	13.3	2.926	1.252
5	19	Boil potato & eggs properly.	6.6	13.1	28.9	23.5	27.9	3.529	1.211
	20	Cut potato and boiled egg properly.	7.4	17.8	30.6	21.6	22.5	3.339	1.216
mean								3.127	1.169

In terms of mean ratings in grade 4, washing fresh fruits/vegetables properly ($x=4.015$), serving tea/fruits to visitors properly ($x=3.729$) and preparing tea/fruits properly ($x=3.497$) were the highest while making nutritional fuction chart ($x=1.979$), displaying a chart on weight and height ($x=2.330$), and washing plate/spoons after eating ($x=2.579$) wer the lowest (Table 12). No activity was done by majority of the students. In fact, six of the 10 activities were carried out by less than 20 percent

of them.

In terms of mean ratings in grade 5, trying my best when I cook foods ($x=4.040$), knowing how to use gas range/stove ($x=3.651$) and boiling potato and egg properly ($x=3.529$) were the highest while knowing the weight of potato, egg, etc. ($x=2.052$), wearing apron before cooking ($x=2.339$), and knowing how to use measuring tools ($x=2.843$) were the lowest (Table 13).

No activity was done by majority of the students.

Table 14. Performance of Grade 6 Students in Skills Test (N=594)

Chapter and Question	No.	Items	Strongly				Strongly		
			Disagree	Disagree	Fair	Agree	Agree	5-point	
			(1)	(2)	(3)	(4)	(5)	Mean	sd
1	Q.9-11	Make invitation card properly.	9.1	17.3	22.1	19.2	32.3	3.483	1.338
	12	Plan the menu for a Tea party.	13.6	21.9	28.6	18.7	17.2	3.039	1.280
2	13	Know how to call & receive a phone.	2.4	7.6	31.3	24.6	34.2	3.806	1.065
	14	Entertain visitors properly.	2.9	9.3	33.8	24.4	29.6	3.687	1.080
3	15	Behave properly in a party.	2.4	7.2	29.3	29.1	32.0	3.811	1.040
	16	Greet older persons properly.	0.8	4.9	18.9	29.6	45.8	4.146	.947
4	17	Plan games for a small party.	21.2	34.2	22.9	12.1	9.6	2.547	1.222
	18	Prepare something for games at a party.	9.1	22.2	32.0	20.7	16.0	3.123	1.192
5	19	Cook Kyung-dan/pear Hwache by myself.	23.4	23.1	21.9	15.3	16.3	2.871	1.389
	20	Prepare table setting for a party.	4.4	9.3	18.7	21.7	46.0	3.956	1.188
mean								3.447	1.174

Table 15. Mean Score of Grade 4 Students on Teachers' Test from the Teaching Guide Book (N=170)

Expectation of Student Performance	%					Mean
	(1)	(2)	(3)	(4)	(5)	
1. To identify need for of various food for healthy life.	3.5	20.0	35.9	31.2	9.4	3.229
2. To classify RDA based on differences in age and sex.	15.3	23.5	21.4	25.9	2.9	2.776
3. To identify sanitary food preparation.	1.8	21.8	31.8	31.8	12.9	3.324
4. to practice skills in preparing fruits/tea, juice properly.	5.3	17.1	37.6	35.9	4.1	3.165
5. To improve dietary practices with deep interest.	14.7	25.9	29.4	23.5	6.5	2.812

In fact, five of the 10 activities were carried out by less than 20 percent of them.

In terms of mean ratings in grade 5, greeting older persons properly ($x=4.146$), preparing table setting for a party highest while planning games for a small party ($x=2.547$) and cooking kyung-dan/pear hwache by myself ($x=2.871$) were the lowest (Table 14).

No activity was done by majority of the students. In fact, four of the 10 activities were carried out by less than 20 percent of them.

4. Teachers' Expectation of Student Performance

Teachers' expectation of student performance was evaluated using a 5-item questionnaire for grades 4 and 5 and a 4-item questionnaire for grade 6. The items were chosen from five chapters in the Text book and the TGB. The 5-point scale was used to

rate students performance based on the objectives from the Teaching Guide Book. In Tables 15 to 17, 75-80 percent was assuming to score (1), 81-85 percent was assuming to score (2), 86-90 percent was assuming to score (3), 91-95 percent was assuming to score (4), and 96-100 percent was assuming to score (5).

In grade 4, the item answered by the highest number of teachers was to identify sanitary food preparation ($x=3.324$) while the lowest was to classify RDA based on the difference of age, sex ($x=2.776$) as shown in Table 15.

In grade 5, the most item answered by the highest number of teachers was to understand principles of food preparation with proper grooming ($x=3.180$) while the lowest was to classify the use of kitchen tools and measuring cups/spoons ($x = 2.483$) as

Table 16. Mean Score of Grade 5 Students on Teachers' Test from the Teaching Guide Book (N=178)

Expectation of Student Performance	%					Mean
	(1)	(2)	(3)	(4)	(5)	
1. To understand principles of food preparation with proper grooming.	8.4	21.3	30.0	23.6	16.3	3.180
2. To classify the use of kitchen tools and measuring cups/spoons.	23.0	27.5	30.9	15.2	3.4	2.483
3. To practice proper use of fuel in cooking.	19.7	26.4	34.3	16.9	2.8	2.567
4. To identify fresh foods from stale foods.	11.2	29.2	30.3	23.0	6.2	2.837
5. To identify thenutritive value of potato and egg.	7.9	22.5	28.1	29.8	11.8	3.152

Table 17. Mean Score of Grade 6 Students on Teachers' Test from the Teaching Guide Book (N=162)

Expectation of Student Performance	(1)	(2)	(3)	(4)	(5)	Mean
1. To practice to plan & make invitation properly.	14.8	28.4	35.8	17.3	3.7	2.667
2. To manifest leadership in initiating recreational activities.	20.4	33.3	25.9	16.7	3.7	2.500
3. To practice food preparation and serving for a Tea party.	9.9	19.1	35.8	28.4	6.8	3.031
4. To practice proper table manners and social manners when invited.	8.0	23.5	30.9	30.9	6.8	3.049

shown in Table 16.

In grade 6, the most item answered by the highest number of teachers was to practice proper table manners and social manners when invited ($x=3.049$) while the lowest was to manifest leadership in initiating recreational activities ($x=2.500$) as shown in Table 17.

Results Related To Research Hypotheses

The following null hypotheses were examined at $P < .05$ level of significance in this study:

Ho 1: Teachers' Perceptions on the importance and difficulty of teaching food and nutrition subjects do not differ.

To examine hypothesis 1, t-test was use. All items which were important and difficult in the teaching of food and nutrition subjects were examined by pairs.

Table 18 shows that in terms of importance food and Nutrition subjects in grade 4 had an overall mean rating of 3.74 or fair while in terms of difficulty, the mean score was 3.19 or fair. The highest t-value was for nutritional problem (16.12) and the

Table 18. t-test Results on Importance of Subject Matter and Degree of Difficulty in Teaching Food and Nutrition by Grade Levels (Gr. 4 N=582, Gr. 5 N=578, Gr. 6 N=594)

Subject Matter	Importance of subject Matters			Difficulty of Teaching			t-value		
	Gr. 4	5	6	Gr. 4	5	6	Gr. 4	5	6
1 Function of Food & Nutrients	3.93	3.84	3.84	3.33	3.13	3.36	11.98*	14.31*	10.32*
2 Requirement/Food Needs	3.43	3.48	3.59	3.04	2.99	2.90	7.51*	9.44*	13.14*
3 Nutritional Problem	3.89	3.73	3.93	3.18	3.10	3.35	16.12*	13.07*	12.50*
4 Food Composition/Classification	3.50	3.35	3.72	2.87	3.18	3.23	12.52*	3.64*	12.21*
5 Food Selection/Meal Planing	3.73	3.60	3.99	3.13	3.22	3.28	12.49*	7.03*	14.76*
6 Food Preparation/Cooking	3.36	3.46	3.62	2.92	3.06	2.91	8.92*	8.92*	13.30*
7 Food Storage/Marketing	3.45	3.47	3.71	3.19	3.22	3.23	6.47*	4.68*	8.99*
8 Food Sanitation	4.19	4.09	4.32	3.60	3.46	3.33	12.87*	12.50*	21.33*
9 Food Preservation	3.85	3.82	3.95	3.46	3.36	3.35	7.56*	9.54*	10.10*
10 Relationship between Nutrition & Disease	4.09	4.12	4.40	3.30	3.47	3.39	14.19*	11.95*	20.96*
Mean	3.74	3.70	3.91	3.19	3.22	3.23			

5-Point Likert-type Scale was used.

1: Very Difficult 2: Difficult 3: Fair 4: Easy 5: Very Easy

* $p < .001$

Table 19. Correlation of Knowledge, Attitudes, and Skills of Students in Graed 4 (N=582)

Correlations	Knowledge	Attitudes	Skills
Knowledge	1.000		
Attitudes	.1546**	1.000	
Skills	.1631**	.7166**	1.000

** $p < .001$

Table 20. Correlation of Knowledge, Attitudes, and Skills of Students in Gradents in Grade 5 (N=578)

Correlations	Knowledge	Attitudes	Skills
Knowledge	1.000		
Attitudes	.0872	1.000	
Skills	.0585	.5175	1.000

** $p < .001$

lowest was for food storage/marketing (6.47) in grade 4. As shown in Table 18, the t -test values were significant at the $p < .001$, sufficient to reject the null hypothesis. Therefore, there was an apparent difference in the teachers' perception of the importance and difficulty in teaching specific subject matter in grade 4. The more importance given to food and nutrition subject matter the less difficult it is to teach.

In grade 5, as in grade 4, importance of subject matter had a higher mean (3.70) than difficulty (3.22). The highest t -value was function of food and nutrients (14.31) and the lowest was food composition/classification (3.64) as shown in Table 18. The t -test values were significant at $p < .001$ level, sufficient to reject the null hypothesis.

In grade 6, as in grades 4 and 5, importance of subject matter had a higher mean (3.91) than difficulty (3.23). The highest t -value was food sanitation (21.33) and the lowest was food storage/marketing (8.99) as shown in Table 18. Generally, t -values were higher in grades 4 and 6 than grade 5. The t -test values were significant at $p < .001$ level, sufficient to reject the null hypothesis.

Null hypothesis 1 (Ho 1) was rejected at $p < .001$ in grades 4, 5, and 6. Therefore, there were apparent difference in the teachers' perception of the importance and difficulty in teaching specific subject matter in grades 4, 5, and 6. In other words, the more

importance given to food and nutrition subject matter the less difficult it is to teach.

Ho 2: There is no significant relationship between knowledge, attitudes, and skills in food and nutrition of students.

Correlation of the students knowledge, attitudes, and skills determined by Pearson product-moment Correlation. Table 19 revealed moderately high and positive correlation between attitudes and skills ($r = .7166$) in grade 4. The correlation was very weak between knowledge and skills ($r = .1546$), although in all cases the correlation was statistically significant ($p < .001$). Therefore, the null hypothesis is rejected.

As shown in Table 20 there was a moderate positive correlation between attitudes and skills ($r = .5175$) among grade 5 students while there was a very weak relationship between knowledge and attitudes ($r = .0872$) and between knowledge and skills ($r = .0585$). Based on these results the null hypothesis is rejected.

Table 21 revealed a moderate and positive correlation between attitudes and skills ($r = .6796$) of grade 6 students. The correlation is significant but weak between knowledge and skills ($r = .2521$) and also between knowledge and attitudes ($r = .2192$). These correlation results were slightly higher than in grade 5. As in grades 4 and 5, the null hypothesis is rejected for grade 6 students.

Table 21. Correlation of Knowledge, Attitudes, and Skills of Students in Grade 6 (N=594)

Correlations	Knowledge	Attitudes	Skills
Knowledge	1.0000		
Attitudes	.2192**	1.0000	
Skills	.2521**	.6796**	1.0000

** $p < .001$

CONCLUSIONS

The results of the study showed conclusions as follows:

1. There were differences in the teachers' perception of the importance and difficulty of teaching specific subject matter in grades 4, 5 and 6.
2. Teachers' perceptions on difficulty of subject matter in food and nutrition were almost the same for the three grade levels.
3. The more the food and nutrition subject matter was considered importance the less difficult it was to teach.
4. Teachers identified nine factors to improve the food and nutrition subject in the elementary school curriculum. The most frequently cited were adequacy of resources and facilities (36.1%) and audio visual teaching materials (16.9%). Other factors mentioned were increased time allotment (4.7%), selection of contents related to new trends/topics interesting to students (9.0%), and decrease in class size specially for laboratory (3.5%).
5. The students listed 20 topics on food and nutrition subject in the elementary school curriculum which they considered interesting. The two most interesting topics were simple and delicious cooking (13.1%), and function of food/nutrients (10.0%). The most interesting topics varied somewhat from one grade level to another.
6. In student performance, grade 4 students got higher scores than grade 5 and 6 students in the knowledge test. Grade 5 students got highest score in the attitudinal test while grade 6 students got the highest score in the skill test.
7. There were moderately high and positive relationships between attitudes and skills but very weak positive relationships between knowledge and attitudes, and knowledge and skills of students in grades 4, 5, and 6.

RECOMMENDATIONS

The following recommendations are based on the conclusions.

1. Contents of the subject matter should be related to new trends and topics interesting to students in each grade level.
2. Adequate resource materials, facilities, and various teaching aids should be given to class activities to improve knowledge, attitudes, and skills on food and nutrition subject.
3. An increase in time could contribute to student's knowledge, and can gradually promote the proper attitudes and skills on food and nutrition in daily life.
4. Proper skills and attitudes should be encouraged to make them effective and efficient teachers in this area.
5. Assist the teacher to assess the extent to which the students are able to apply their knowledge, attitudes, and skills in the home. This becomes a feed back mechanism between school and home.

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