EFFECTS OF TEACHERS WAIT-TIME AND COGNITIVE QUESTIONING LEVELS ON STUDENTS ACHIEVEMENT IN FOODS AND NUTRITION AND CAREER ASPIRATIONS

BY

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DECLARATION

I hereby declare that the thesis has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree. All materials used have been acknowledged accordingly by means of references.



AISHA Z. MOHAMMED

CERTIFICATION

This thesis entitled "Effect of Teachers Wait-time and Cognitive Questioning Levels on Students Achievement in Foods and Nutrition and Career Aspiration" by AISHA Z. MOHAMMED meets the regulation governing the award of the degree of Doctor of Philosophy in Curriculum and Instruction (of Education Department) of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This thesis is dedicated to my parents and husband in appreciation of all you have done towards my educational achievement. To my children - Zia, Asiya, Khalil, Siraj, Aliya and Zahida for their cooperation and numerous inconveniences during the course of this study.

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With gratitude to Allah, S.W.A. who has given me the ability to start and end up this programme successfully, I write to acknowledge the involvement of several individuals whose interest contributed in no small amount to the successful completion of this thesis.

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ABSTRACT

The research was meant to examine the effects of Teachers Wait-time and Cognitive Questioning Levels on Students Achievement in Foods and Nutrition and their Career Aspiration. The study also tried to determine the inter-relationships between teachers and wait-time I and II, teachers cognitive questioning levels, students achievement and their career aspirations.

The subjects for this study comprised of 32 secondary school teachers and 400 senior secondary school final year students in Kaduna State. The instruments used include stop-watch, tape-recorder, achievement test items and a career aspiration questionnaire which was meant to seek information on the career aspiration of each student. The data was collected through pre and post test control group design.

The findings of the study revealed that:

- Foods and Nutrition teachers ask more questions at the low cognitive questioning level and few questions from the high cognitive level.
- Use of extended wait-time I relates to students achievement
- Teachers low cognitive questioning does not relate to

student achievement but the study revealed that teachers high cognitive questioning relates to students achievement.

- Students achievement in Foods and Nutrition relates to their career aspirations.
- Foods and Nutrition Secondary school students preferred services occupations such as Dietary Assistance, Welfare Services, Catering Services and Research in Foods and Nutrition.
- The control group and experimental group of the study view their occupational preferences differently.

From the findings, the following recommendations were made (1.) Seminars and Workshops on the use of extended wait-time and high cognitive questioning should be organized for secondary school teachers and teachers of tertiary institutions. This could help practicing teachers to see the importance of wait-time and high cognitive questions in an enquiry classroom.

(2.) That the use of wait-time treshold of 3-4 seconds is more appropriate so as to provide students with enough thinking time for meaningful responses.

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ABBREVIATIONS

Foe the purpose of this study the following abbreviations are defined:-

S.S.S	Refers to the Senior Secondary Schools.
W.A.E.C.	Refers to West African Examination Council.
M.F.A.T.I.	Refers to Mohammed's Foods And Nutrition Achievement Test Instruments.
E.R.C.	Education Resource Centre
MOPS	Motivation for Occupational Preference Scale
R	Randomised
O_1	Pretest before the experiment
X	Treatment given to the experimental group
O_2	Post tested at the end of the experiment

DEFINITION OF TERMS

For the purpose of this study, the following terms are defined.

WAIT-TIME:	Is the amount of time a teacher has to wait after a question is asked before accepting an answer or before the teacher rephrases or repeat the question
CAREER ASPIRATION:	Is what an individual thinks he will do with regards to work in future given the opportunity.
COGNITIVE QUESTIONS:	Deals with the development of intellectual abilities and skills in questioning. It has six levels according to Bloom (1956).
ACHIEVEMENT:	Students Academic Performance

CHAPTER 1

INTRODUCTION

1.1 Background

Foods and Nutrition is a subject among several other subjects in the field of Home Economics. Whereas most people are farmiliar with food ,they are less familiar with nutrition science.

Nutrition science is comparatively a member of the group of biological sciences. It is an applied science which may be defined as how the body uses the food intake. That is, it may be considered as "the science of the food and its relation to health" (Vail, Rust, Phillips and Justin, 1973:2).

Uddoh (1980) defined nutrition as "the study of the food human beings eat and what it does to the body". According to Uddoh, good health is achieved by eating the right kinds and amount of food at all times. In effect, nutrition deals with the relationship between food and health of human beings.

Nutrition is more than just eating the right food. As a field of study it has physiological, biochemical and behavioral aspects and it reaches into the realms of agriculture, food technology, medicine, economics, ecology,

business, politics and international stability (Brigg and Calloway, 1973). This wide conception suggest that a more detailed and scientific background knowledge of nutrition is essential for understanding the importance of food to the human body.

Experience has shown that generally students find foods and nutrition as a rather difficult subject, since it draws from many other fields of study such as bio-chemistry, microbiology, physiology and physics. However, when students have carefully developed interest in the subject they confess that it is a very useful and interesting subject. To help students develop scientific thinking in foods and nutrition, Food and Nutrition teachers have to challenge the minds of the students so as to arouse curiosity and guide students thinking abilities. This can be successfully done through effective questioning.

A question may be defined as an interrogative statement or clause requesting information or an answer. Brown and Edmondson (1984:94) defined a question in the classroom as "any statement intended to evoke a verbal response". This definition includes both " problems and project" (Sander,1966:2).Questions have always been the

major stock in trade for teachers. At all levels, students are piled with different kinds of questions. Generally, questions have been used to determine what has been learned, too often as isolated bits of knowledge which may be of little value to the teachers and pupils. Thus, teachers have different intentions when asking pupils questions.

The elements which make a good question are precision, clarity and close connection to the matter on which the question is based. Good questions recognise the wide possibilities of thought and are built around varying forms of thinking. Such questions are directed towards learning and evaluative thinking rather than determining what has been learned in a narrow sense. Importantly, classroom questions help students to develop more effective and diversified thinking, which should prove valuable not only in their student days but indeed, throughout their lives.

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thinking, which should prove valuable not only in their students days but indeed, through out their lives.

However, there is a marked difference in the competence of teachers in the art of questioning. Sander(1966:3) stated that "the teachers most talented in questioning are usually deep and continuing scholars who tend to go further in pursuit of further knowledge which invariably make them more competent in the teaching profession."

Schwab(1962) stressed the importance of questions as an effective tool to elicit enquiring behaviours in classrooms.This point was stressed by Williams and Buseri (1986:102) who stated that "asking of questions is desirable,especially if teachers are going to be able to stimulate students thinking in such a way as to develop complex bodies of concepts and exert the pupils cognitively". Similarly, Kissock and Iyortsuun (1989) emphasised that learning is increased when teachers use questions effectively to help students develop and use their critical thinking abilities. Thus, it is pertinent that teachers involved in enquiry teaching learn the skill of questioning in order to make for effective teaching.

There are certain other discrete variables which can

affect the teachers questioning skills adversely, if not checked. These variables include teacher's verbal behaviour in the classrooms and wait-time.

Wait-time.

Wait-time is the length of pauses between a teacher's question and a pupil's response or between that response and the teacher's subsequent reaction. It is a phenomenon that affects teachers questioning skills especially in an enquiry oriented classroom. Rowe (1974) noted that even when a teacher has mastered the skills of questioning and is teaching highly receptive class, the questions may result in little or no learning if he fails to make proper use of wait-time. According to Rowe, longer wait-time tended to favour enquiry. Wait-time provides the period of "private thought" which is found to be valuable for students engaged in enquiry studies (Moriber, 1971).

In the last two decades, Rowe's work has stimulated a number of studies on wait-time, which has been found effective in an enquiry lesson. In a typical enquiry lesson, the students perform the learning activities by themselves while the teacher guides the performance of these activities by asking leading questions with proper

use of wait-time.

However, the researcher has observed that some critics from practicing teachers, are against the over-emphasis on wait-time as there is a costly trade-off. The contents that the teacher plans to cover for a lesson and perhaps the approved course contents and scheme of work may remain uncovered in the long run, where the teacher is very conscious of wait-time. As such, wait-time may not necessarily be attractive to practising teachers. It was the overwhelming evidence of success with questioning wait-time variable that encouraged the conduct of several researches to determine the wait-time of physics teachers, integrated science teachers and social studies teachers in Nigeria(Gyuse,(1982) Olajide, (1986) and Mu'azu, (1991)) .

Foods and Nutrition.

In recent times, nutrition programmes have tended to induce noticeable changes in the eating habit of both urban and rural families in Nigeria. Nutrition education through electronic media programmes such as the Maggi Cooking programme of the Nigerian Television Authority, "Uwargida Barka da Yau", a Hausa radio programme, the weekly Show

Time/Menu Time programme of the NTA, etc. all seem to be having desirable effects on the eating habits of Nigerians and varieties of Nigerian dishes. It is observed that:

1. the food habits and beliefs of families have changed drastically, from eating the same food or combination of food repeatedly at regular intervals to eating a variety of foods that contain the recommended kinds of nutrients the body needs for healthy growth;
2. nutrition education programmes taught in schools and hospitals (pre-natal clinics and immunisation centres) have in various ways been promoting weaning diets, breast feeding and nutritional needs of both pregnant and lactating mothers;
3. extension services through health workers, Home Economics extension workers and nutritionists have been on the increase. The ultimate aim is to improve the level of nourishment and state of especially rural families, thereby raising their standard of living.

The subject, Foods and Nutrition, as taught in secondary schools in Nigeria has as one of its objectives, the promotion of young pupils awareness of the food and nutritional needs of the family and the society at large. It is therefore important for secondary school students to

develop a solid foundation in foods and nutrition.

The subject, Food and Nutrition, is offered mainly in girls secondary schools in Kaduna State. Records obtained from the evaluation unit of the Educational Resource Centre (E.R.C) Zaria, showed that not all the schools consistently offer the course. There is a variation in the number of schools that register their students in the course with WAEC annually. Table 1:1 below shows students general performance in foods and nutrition.

Table 1:1 General Performance in S.S.C.E Food and Nutrition(at Credit level), Kaduna State from 1991-1995

YEAR	NO. REGISTERED	NO. PASSED	%	NO. FAILED	%
1991	775	390	50.3	385	49.7
1992	672	375	55.8	297	44.2
1993	680	348	51.2	332	48.8
1994	Nil	Nil	Nil	Nil	Nil
1995	473	238	50.3	235	49.7

Source: E.R.C. Zaria; Evalution Unit

In the above Table the performance of students in Foods and Nutrition shows that out of 775 students who sat for the examination in 1991, 50.3% passed with credit while 49.7% failed. in 1992, 672 students sat for the examination 58.8% passed while 44.2 failed. In 1993, 680 sat for the

examination with 51.2% passed and 48.8% failed. While in 1995, there was 50.3% passed and 49.7% failed out of the 473 students who sat for the examination. The results of the 1994 examination are not reflected because W.A.E.C. withheld it.

The general performance in Foods and Nutrition from the above table 1:1 has been average with about 50 percent success over the last four years. The researcher feels that to a large extent these results might be much improved upon when teachers make use of questioning Wait-time variable.

CAREER ASPIRATIONS.

The concept of career aspiration, preference and choice are seemingly interwoven in meaning .There is yet to be clear distinction in the definition of the concept in the literature on career in vocational guidance and counselling.

However, Crites (1969:) defined aspiration as "what the individual considers to be ideal vocations for him " In other words, a vocational or career aspiration is what the individual thinks he would do in respect for work in the future given the opportunity, interest, attitudes, personality and training. It can therefore be equated to

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the individual's career day dream or fantasy . In most cases, especially the theory of Ginzberg and his et al (1951), the concept of career aspiration or fantasy is related to the early childhood when every career is appealing to the child. He feels he wants to be a teacher, nurse, soldier, pilot, lawyer, etc. at the same time. It is therefore a career of wishful thinking. However, it should be noted that one's career aspiration may eventually turn out to be his final choice. This depends on a number of factors e.g. capabilities and potential traits which if not found appropriate, the aspiration will remain fantasies.

Secondary school students in their final year (SS III) are often faced with a choice of career decision. Ginzberg's et al (1951) general theory of occupational choices suggest that occupational choice is not a single decision but a development process which takes place over a minimum of six or seven years and more typically over ten or more years. On the other hand, O'hara's (1968) theoretical approach views career development as a learning process based on knowledge of the individual past history, current stimulus situation and present motivational stimulus. According to her, the major assumption guiding the learning theory approach is that the determinants of

occupational selection are not just random behaviours; they are learned behaviours. O'hara reasoned that changes in occupational behaviour are as a result of the cognitive changes that people are exposed to during classroom interaction. For example, boys and girls learn to be electricians, doctors, teachers and nutritionists, etc. as a result of an understanding of the intimate relationship between education and occupation. This approach according to O'Hara does not detract from the importance of affective and psychomotor learning but merely recognise that a core of the cognitive material is required to make intelligent occupational decisions. The researcher feels that teachers cognitive questioning style can influence students choice of career. This is because the more the student is exposed to a particular questioning style the more the student is likely to choose a career consistent with that style of training. In other words, for a vocational learning to take place, an approriate learning environment is required. However, having an appropriate learning environment depends on the learning styles teachers employed in the classroom interactions which at the end will bring about the required vocational changes in students behaviour.

It is also natural that human learning differs

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according to individual capabilities, interests, and personality (Super, 1963). Some people will be proficient with peculiar varieties of learning and performance than others. For instance, some people are good in hand work while some are good in theoretical work. Furthermore, nearly all occupation involve some problem solving and some thinking. The factors to consider are: (i) the relative amount of performance at several levels in a given occupation and (ii) the peculiar kinds of problem solving in a given occupation. That is, occupations can be described in terms of required kinds of problem solving performance in terms of how much of the total performance is at each of the levels of learning (Larry and Renold, 1973).

The adolescence should be helped to understand the relationship between various teaching/learning styles and their occupational implications. For example, if teachers teach students to be involved in critical thinking with enough wait-time, and to ask pertinent question at the higher cognitive levels in foods and nutrition class, students might be expected to become more academically oriented in their pursuit, such students should express greater desire to become nutritionists with a

responsibility to improve nutritional conditions through teaching and research. Other related careers students might choose, if exposed adequately to higher cognitive questioning levels in foods and nutrition classes include food specialist, hospital dietician and extension services.

If teachers teach students to operate at the application levels in cognitive development in nutrition classes, students might be expected to exhibit more appropriate skills in food services. The present researcher feels that students career aspirations might be affected by cognitive questioning and wait-time variables.

1.2 Statement of the problem.

Questioning wait-time has been recognised as a vital tool in the teaching and learning process by many researchers such as Rowe (1974), Anshutz (1975), Lake (1975), Tobin (1980,1983,1984) and Riley (1986). It has been shown that learning is increased when teachers use questioning wait-time effectively to help students develop and use their critical thinking abilities (Rowe,1974; Lake, 1975; and Rowe, 1986). It is recognised that successful classroom questioning is an art that can be cultivated through practice. In Nigeria teachers do use questions in

classroom interaction with students (Gyuse, 1982). These questions however tend to be lower order questions, which require only recall or comprehension on the part of the students to respond. Teachers tend to neglect the higher levels of thinking, (on Bloom's model) such as analysis, synthesis, and evaluation. The latter levels are valuable for the development of critical thinking (Gyuse, 1982). In another research conducted in Nigeria by Ogunniyi(1981) Olajide (1986) also revealed that the use of mainly information and rhetorical questions in instructions by science teachers tended to prevent students form developing higher level of cognitive ability. He observed that in spite of the new emphasis of the new science curricula on critical thinking and higher cognitive objectives, science teachers used for the study persisted in using mainly factual and rhetorical questions. Teachers inability to use higher cognitive questioning when teaching could according to Tobin(1984) and Copper(1977) affect students performance on an achievement test.

Similarly, Ohara (1968) views career development as a process which occurs as a result of the cognitive changes students are exposed to during classroom interaction. This

according to Ohara has implication on the students choice of career. In other words, low achievement resulting from teachers questioning habits, the quality of their questions and teachers ineffective use of wait-time variables when teaching may be associated ultimately with career choices of students.

In spite of all the various studies on wait time and questioning skills, little emphasis seems to have been placed on the relationship between teachers wait time and students achievement as they affect students career aspirations in foods and nutrition. The present study intends to fill this vacuum.

1.3 Objectives of the Study

The objectives of the study were to:

1. Determine the mean wait-time I and II of Home economics teachers teaching food and nutrition ;
2. Determine the cognitive questioning levels of teachers;
3. Determine the relationship between teachers wait-time and cognitive questioning levels on students achievement in foods and nutrition and their career aspirations;

4. Determine the inter-relationships amongst teachers wait-time I and II, teachers cognitive questioning levels, students achievement and their career aspirations;

1.4 Research Questions

The present study sought answers to the following research questions.

1. What are the mean wait-times I and II of Home Economics teachers teaching foods and nutrition?
2. What are the foods and nutrition teachers cognitive questioning levels?
3. Do teachers wait-time I and II relate to students' academic achievement?
4. Do teachers level of cognitive questioning relate to students achievement?
5. Do students achievement in foods and nutrition relate to their career aspirations?

1.5 Hypotheses

The following null hypotheses were tested.

1. There is no significant difference between the achievement of students in the control and

experimental group taught with wait-time 1.

2. There is no significant difference between the achievement of students in the control and experimental group taught with wait-time II.
3. there is no signification relationship between teachers low cognitive questioning level and students achievements in foods and nutrition.
4. There is no significant relationship between teachers high cognitive questioning levels and students achievements in foods and nutrition.
5. There is no significant difference between the mean scores of students in the experimental group and those in the control groups with regards to their achievement in foods and nutrition.
6. There is no significant difference between the mean scores of students in the experimental group and those in the control group with regards to their career aspirations.
7. There is no significant relationship between students academic achievement in foods and nutrition and their career aspirations.
8. There is no significant difference in the distribution of all the respondents across the career types.

1.6 Assumptions.

This study was based on the following assumptions:

1. That it is the teacher that controls wait-time in a given classroom lesson;
2. That teachers can be taught to increase their wait-times. that is, teachers can be trained to use a wait-time I threshold;
3. That shorter-than-threshold wait-time tend to encourage rote learning;
4. That rote learning is prompted by lower cognitive level questions;
5. That senior secondary III students achievement in foods and nutrition can be investigated using teachers wait-time;
6. That students career aspirations can be determined using career aspirations test.

1.7 Significance of the study.

Researches have been conducted in Nigeria to determine the wait-time of Physics teachers, Integrated Science teachers and social studies teachers by Gyuse (1982), Olajide (1986) and Mu`azu,(1991) respectively. But there has been little published works on wait time of foods and

nutrition teachers in Nigeria. A study of this nature will not only help to improve classroom teaching in foods and nutrition but will also add to the literature in this area.

Questioning is a fundamental component of the teaching/learning process in the classroom, Kissock and Iyortsun (1989) emphasised that learning is increased when teachers use questions to help students develop and use their critical thinking abilities. It is important that the foods and nutrition teacher become familiar with the different ways in which questions serve as an effective communication process in their classroom. Thus, the result of the study should be useful in promoting students achievement in foods and nutrition.

Rowe (1974) and Tobin (1987) found that when students are given three to five seconds of undisturbed "wait-time" several positive outcomes from both the students and the teachers occur as outlined in section 1.1 of the present study. From the result of this study, foods and nutrition educators should confirm/validate Tobin and Rowe's findings in the foods nutrition classes in Nigeria.

Similarly several theories of career development such as Ginbergs theory (1951), Super (1958) and Ohara (1968) theory viewed career development of students as a learning

process which can be facilitated by involving students in various learning situations which have occupational implication. Salton (1980) reported that students believe that their works as human beings depend on the amount of ability they posses and that their performance on achievement tasks will demonstrate their level of ability. It is therefore necessary that when students begin secondary school education, they should be involved in activities of the exploratory stage of vocational development. These activities could consist primarily of gathering information on one self and the occupational world. The key role of the teacher according to Salton (1980), is to set enquiry questions that will engage the minds of the students in critical thinking. This is necessary to equip students with the skill necessary to cope with transition from studies to work place and vice - versa. The result of the present study should therefore help teachers to be aware of the intimate relationship between education given to the students and the career he/she would aspire for in future.

1.8 Scope of the study

This research investigated the effect of teachers

wait-time and cognitive questioning levels on students achievement in food and nutrition and their career aspirations. The study was delimited to Home Economics teachers teaching food and nutrition in selected ten secondary schools of Kaduna state.

The study was delimited to S.S.III foods and nutrition students. Only a sample of this category of students were used for the study. The model used to determine the cognitive level of teachers questions was the Bloom's taxonomy of educational objectives. All the six levels of Bloom's cognitive levels were used to assess the cognitive levels of the teachers questions.

However, some critics about Bloom's Taxonomy such as Seddon (1978) maintained that there is not doubt that Bloom's taxonomy of education objective for the cognitive domain has had a considerable impact on educational thought and practice all over the world. The authors of the taxonomy however made various claims about its properties which concern educational and psychological issues. Nevertheless a final assessment of the validity of the claims concerning the psychological properties of the taxonomy leaves behind an uncertain picture, since no one has been able to demonstrate that these properties do not

exist. However, the studies conducted on Blooms taxonomy concluded that the psychological issues can be assessed only after a consideration of the educational issues. In addition Kropp Stoker (1966) and Madaus et al (1973) concluded that Bloom's cummulative hierarchy i.e. Bloom's categories of knowledge comprehension, application and analysis were in the correct relative order, but that synthesis and evaluation were not correctly placed. It should be noted that the evidence that is by no means conclusive, it should be used merely as an encouragement of or justification for the carrying out of further experiments with the hope that the solutions will be found before another twenty-two years elapse (Seddon, 1978).

The research was further delimited to Home Economics teachers who had a minimum of a first degree in Home Economics. and are presently teaching foods and nutrition. The researcher was only interested in Home Economics teachers with a minimum of first degree in Home Economics. While the reason for choosing the senior secondary III students offering foods and nutrition was that such category of students must have had the opportunity of learning basic Home economics for at least five years and would be taking their final examination in foods and

nutrition. In addition these students must have at this time conceptualised in their minds of what to do immediately they finish their secondary school. Thus, such category of students were in a better position to express themselves when faced with cognitive questioning levels and career choices.

CHAPTER 2

REVIEW OF RELATED LITERATURE

The selected literature for this study are presented under the following headings:-

2.1 Cognitive Questioning Levels

2.2 Wait-time Studies

2.3 Effects of Questioning on achievement

2.4 Effects of achievement on career aspiration

2.5 Summary

2.1 Cognitive Questioning Levels

2.1.1 Introduction.

Wait-time is related to question and question is important in the classrooms. The use of question in teaching is as old as teaching. In many parts of the world, teachers questions are common features of the classrooms. Questions have been used to determine what the pupils have learned. In other words, question demand not only the recall of facts presented to the pupils during the course of unit of study but they also require them to comprehend, apply, analyze, synthesize and evaluate information. It is a fundamental tool of enquiry in the teaching learning

process. It is therefore important that teachers become familiar with the functions of questions in the classroom.

2.1.2 Functions of Questions.

Questions can be used to:

1. determine what the pupils have learned;
2. assess the effectiveness of teaching, that is, the degree of success in achieving the goals and objectives of the lesson;
3. arouse interests and curiosity concerning a topic;
4. focus attention on a particular issue or concept;
5. introduce new materials, that is a preliminary introduction to new materials (Banks,1977);
6. encourage pupil initiated questions;
7. review and summarise a lesson;
8. initiate and guide class discussion;
9. provide an opportunity for pupils to assimilate and reflect on information;
10. diagnose specific difficulties inhibiting pupil's learning;
11. develop an active approach to learning(Turney, 1973 in Wragg, 1984).

The above functions explain the fact that questioning

plays an important role in the classroom. According to Sander (1966), an effective teacher must be an effective questioner and the first step in effective questioning is to recognise that questions have distinct characteristics, serve various functions and create different levels of thinking. Some questions, according to Sanders, requires only factual recall; others cause students to go beyond memory and use other thought processes in forming an answer. Both kinds of questions are useful, but teachers tend to place emphasis on the factual type of questions that does not provide for effective learning. Learning the different kinds of questions and the different functions they serve is a crucial step in being able to use all types of questions effectively. This implies that teachers themselves must be familiar with the use of the taxonomy of educational objectives in questioning, as defined by Bloom (1956) and Krathwohl et.al. (1964).

2.1.3 The Taxonomy of Educational Objectives

And Its Relationship To Questioning.

Blooms taxonomy is probably the best known system for classifying educational objectives as well as classroom questions. The basic ideas underlying the study of questions came from the, Taxonomy of Educational Objectives, Handbook I: Cognitive Domain, edited by Bloom(1956) and Handbook II Affective Domain edited by Krathwohl (1964). These books are guides for teachers in developing questions. The word 'taxonomy' refers to a special system of classification in which the classes are sequential(and hierarchical) rather than arbitrary(Sanders, 1966). The interest in these educational objectives, as far as questioning is concerned, lies in the categories of thinking which the authors of the taxonomy have defined. Bloom and his colleagues proposed that in the cognitive domain the categories include: knowledge, comprehension, application, analysis, synthesis and evaluation.

The cognitive domain which is the focus of the present study deals with recall of or recognition of knowledge and the development of intellectual abilities and skills(Bloom,1956). The definition of its categories and a sample of questions relating to' Nutrients that constitute

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'Balanced Diet, is provided below, by sequential level of the domain.

1.00 Knowledge

This category is concerned with the ability to recognise and recall facts in a form close to the way they were first presented. For example: "List six types of nutrients that constitute a balanced diet".

2.00 Comprehension:

Is concerned with the ability to grasp the meaning and intent of information and be able to translate it in ones own words showing that one understands. For example,' explain two functions each of carbohydrate, protein and vitamins in a meal of yam pottage.'

3.00 Application

Is the ability to use information that is, the pupil should be able to apply what has been learnt to new situations and real life circumstances. For example,' prepare a balanced meal for a marasmic one year old baby.'

4.00 Analysis

Deals with reasoning, that is the ability to break down information into component parts and to detect relationships of one part to another and to the whole. This is to show that one perceives and can pick out the most important points the materials presented. For example, 'Why is it that a bank managing director was served a meal of Irish potatoes while a farmer was served Garri and vegetable soup as lunch, on a hot working day?'

5.00 Synthesis

Is concerned with originality and creativity, that is the ability to assemble separate parts to form a new whole. Pupils are expected to show that they can combine concepts to create an original or new idea. For example, 'Propose a plan for a balanced dinner to meet the needs of a sixty year old hospitalised woman who is recovering from a major surgical operation.'

6.00 Evaluation

Is concerned with the ability to make value judgements, based on a set of criteria or standards. That is, pupils should show that they can judge and evaluate

ideas, information, procedures and solutions. For example, 'Why do we consider the nutritive content of convenience food (e.g. canned pineapple fruit) to be less than freshly prepared pineapple juice?'

From the above examples, it is obvious that at the knowledge level, pupils are asked just to remember information or facts as it was learned. The question demand that pupils list six types of nutrients that constitute a balanced diet. This means that a certain amount of material would have been memorised if the pupil has to recall the facts needed by him to provide correct responses. Although memorization of material needs not be encouraged at the expense of higher order knowledge in food and nutrition lessons, the knowledge or memory category is still critical to all other levels of thinking and reasoning. Pupils cannot be asked to think at higher levels if they lack fundamental information. For example, the pupils should be able to simply recall the six types of nutrients, such as protein, carbohydrates, minerals, vitamins, fats and oils and water, before they are able to interpret in their own words the role of each nutrient in the body. The knowledge level is therefore very important in any learning

situation. Emphasis should however be placed on the understanding of facts, concepts and generalizations.

Likewise, in order to answer a comprehension question the student must go beyond recall of information. The pupil must demonstrate a personal grasp of the material by being able to rephrase it, to give a description in his/her own word and to use it in making comparisons. The comprehension levels discussed in the example given included translating and interpreting of two functions each of carbohydrates, protein and vitamin. That is, after the pupils have been presented with an idea, they are then asked to restate the same ideas in another form.

Application questions are similar to comprehension level questions in that the pupils are required to use ideas learned previously in problems new to them, as for example, in preparing "a balanced meal for a marasmic one year old baby". The students will use the ideas learned previously (that is knowledge of the function of each nutrient) to prepare a balanced meal for a marasmic baby. However, an application question goes one step further. While in an comprehension question the pupil must show that he can use an idea whenever the problem calls for it. In other words, application questions are designed to give

pupils practice in the transfer of training "to new situation" (Sander, 1966). Application questions most often require pupils to solve some problems, to construct a model, to use a skill or take some appropriate form of action.

Teachers should note that in application questions, pupils are provided with opportunities to apply knowledge gained at the comprehension and knowledge levels. It is essential that teachers spend time in helping pupils to apply the knowledge and skills acquired so as to develop the ability of self discovering.

Teachers should also note that each succeeding level of the cognitive domain is dependent upon satisfactory achievement of the lower level. It is only when pupils can prepare a balanced meal that they would be able to analyze a meal served to a managing director and a farmer.

Analysis questions provide the pupils opportunities for critical thinking. They not only help students learn what happened, they also help them search for the reasons behind what happened (Sadker and Sadker in Cooper, 1977a). Likewise, while analysis questions ask pupils to break a whole into a part, synthesis questions ask pupils to put parts together to make patterns that are new to them.

Synthesis questions encourage imaginative, creative thinking. The problem is presented in an open-ended fashion and as many solutions as possible are encouraged. As in the sample question asked under synthesis level, the pupils are required to propose a plan for a balanced dinner to meet the needs of a sixty year old hospitalised woman who is recovering from a major surgical operation. The synthesis question gives no cues to the pupils and is intended to be broad and open ended. This means that the question does not imply one right answer, but instead assumes a variety of possible solutions, any of which could be acceptable (Banks, 1977).

Evaluation questions deal with that area of questioning related to judgement of values and choice. An evaluative question tends to force a pupil to organise his thoughts and knowledge, to reach a decision, and also to take a position which he is willing to justify or to defend.

As in synthesis questions, pupils are not necessarily right or wrong in the evaluation they make, because the judgement is based upon some evidence and standards which they or some other persons or group has established. It is therefore important for teachers to be able to help their

pupils choose suitable standards which they will use in making value judgements. The foods and nutrition teacher should know that occasionally when asking questions, a level can be by-passed, but this should be done with caution. In the examples mentioned above, students could not have evaluated any canned food or fruit without having prior knowledge of the functions of each nutrient or without having prepared a balanced diet. In this instance, it is conceivable that in a comprehensive foods and nutrition course such as the J.S.S. course it would be possible to include only the first two levels of the cognitive questions related to types of nutrients. For a course in which foods and nutrition is studied in depth, for example, in senior secondary schools, all the six levels would probably be included, with several objectives at some levels, particularly the lower ones.

It is upon these categories that questions are developed to test and improve pupils thinking capacities. Teachers must know the different classification of questions. They must also know how to construct questions on each of the categories of thinking. However, many teachers still pay more attention to recall questions, which require pupils to recall information and facts. They

neglect the higher levels of thinking, such as analysis, synthesis and evaluation which are valuable for the development of critical thinking. Teachers also ignore the affective aspect of learning when asking questions. Teachers should inculcate in their pupils the right types of values and attitudes. This could be done by providing opportunities for the pupils to develop their abilities to engage in critical thinking. The pupils need to have enough time (wait-time) to think about the teachers question and to respond to it, especially in an enquiry classroom. This can be successfully done through effective use of wait-time variable. It is therefore, important that teachers possess some knowledge of the relationship between enquiry skills and wait-time.

2.1.4 The Relationship Between Enquiry Skills and Wait Time.

Most educational writers define enquiry in terms of the processes involved to resolve uncertainty. It can be traced to the terms "reflective thinking" and" critical thinking" as used by Dewey(1933).

Suchman (1966) described enquiry as learning that is meaningful and intrinsically rewarding to the learner. During enquiry, the learner attempts to close the gap

between beliefs and observations. The learner uses data to organise observations and account for discrepant events. The learner is motivated by a desire for closure (the need to know and understand) and the desire to satisfy curiosity.

From Suchman's description of enquiry one can conclude that enquiry learning is a way of making decisions, using a scientific method. The enquiry begins inductively as the student becomes aware of a problem, but as the process continues, the student uses deductive processes. In practice, enquiry is not necessarily a precise process. Generally, the student proceeds through the following stages:-

1. Problem definition:

i) students recognise a problem or puzzlement;

ii) students narrow and limit the problem to make it meaningful and manageable by asking questions;

iii) students attempt to define key aspects of the problem.

2. Hypothesizing:

i) students begin to generalise about the problems;

ii) ideas are discussed as possible solutions to the problem;

iii) students continue to define terms and state hypothesis.

3. Exploration:

i) students plans and decides what evidence is needed;

ii) students search for evidence to support the tentative solutions, Using the following: observation, library resources, experiments, case studies, interviews, role-playing, field trips, original documents, etc.

iii) students gather data on the basis of relevance to the hypotheses.

4. Data Analysis:

i) students evaluate data, noting objectively, reliability, the sources and biases;

ii) data are contrasted, similarities and differences are noted;

iii) trends and sequences are noted, data are summarised and interpreted.

5. Reaching a Decision:

i) hypotheses are rejected, not rejected or modified;

ii) hypotheses are restated, not rejected or modified;

iii) students generalise and suggest ways to test generalisations in new situations (Lemlech, 1990).

The teacher should note that students deprive some

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benefits from enquiry methods such as intellectual relatedness, motivation, satisfaction and involvement in the learning experience. To a large extent, these enquiry skills constitute those used for a typical scholarly investigation.

2.1.5 Attributes of a Skilful Teacher

Schwab (1962) described the product of scientific enquiry as "the accumulated and systematised tested body of knowledge, which includes concepts and principles". These form the bases which scientists use in their construction of broad conceptual schemes, called theories or laws. According to Van Deventer (1967), enquiry is "the total configuration of behaviours involved in the struggle of human beings for reasonable explanation of phenomenon about which they are curious". Van Deventer himself believes that the heart of the enquiry process are in the questions asked. And that it is the unanswered and sometimes unanswerable questions that are the focus of enquiry. Teachers must know what questions to ask and where to find the answers.

In line with the above views, Sund and Trowbridge (1967) observed that an enquiry-oriented teacher seldom tells but questions. Such a teacher according to them, is a

good conversationist, who listens well and asks appropriate questions. On the same note, Wilson (1969) stated that the skillful teacher is one that has the talent for asking appropriate questions and can guide learners to answer correctly.

Esler(1973) stated that enquiry is taking place any time the child is required to go beyond the presented information to gain more insights. According to Esler, the student forms conclusions on his own, and believes that teachers ask open questions. By this definition, it is clear that enquiry skills can best be learned in the classroom if teachers are skilful in asking appropriate questions.

Esler(1973) determined three kinds of enquiry, namely: rational, discovery and enquiry by experimentation. Rational enquiry takes place when a teacher presents a problem through demonstration, pictures, graphs or tables and conduct a discussion which leads to some generalizations. In a rational enquiring class, the children reason their way to gain fresh insight from a discussion eg a teacher might show her class pictures of the teeth of various animals and lead them to conclude that the shape of animal's teeth and the food which they eat are

related. In rational enquiring, the teacher does not tell the children what to conclude but list them through qestioning to form a conclusion on their own.

Enquiring by discovering according to Esler(1973) refers to a situation when the teacher puts materials for groups of children to manipulate by themselves through the verbal interaction that takes place among them. By so doing, the children will discover for themselves what they observe. This according to Esler,is enquiry by experimentation. In experimentation, the student identify the problem, formulate hypothesis which are inferences concerning possible solutions to the problems etc. just like Suchman's scientific method discussed in section 2.2 of this study.

The teacher should ask and also respond to the diverse questions asked during the enquiry lessons. In fact, the teacher should give the students opportunity to think for themselves by asking them high cognitive questions and encourage them to think critically by giving them time(wait-time) to think about the questions.

According to Suchman (1965) there are six rules that can help teachers implement the enquiry class room. These are:

(a) Students should be encouraged to ask questions and should be taught how to phrase questions so that they could be answered with "yes or no". This would prevent the teacher from explaining the ideas under study and would encourage the students to seek more information.

(b) Students should be allowed to ask as many questions as they wish when they initiate their questions. This give them the chance to gather a great deal of information through question asking.

(c) Avoid evaluating the work or accuracy of explanations that students give to problems or events. The teacher should let the students test their own ideas from the data they gathered instead of judging their reasoning ability.

(d) Allow students to test an idea at any time.

(e) Encourage interactions and discussions among students. This will give them the opportunity to present their ideas and become involved.

(f) Allow students to mess "around" with lots of materials connected with a giving enquiry session. The students are to be given the freedom to explore their ideas from apparatus and in books, if they desire their

explorations.

From the above rules students who engage in enquiry are active learners. Thus, teachers are supposed to motivate them to pursue their own learning. Teachers are to guide students to learn.

Teachers should note that they are not just to ask questions but they should learn to ask thought-provoking questions, and that the quality of a discussion depends on a large part on the type of questions asked, their sequence and how teachers handle the answers (Moriber, 1971).

Similarly, Kissock and Iyortusuun (1989) stated that learning is increased when teachers use questioning skills effectively to help students develop and use their critical thinking abilities. High level questions, according to them, can help students to organise their thoughts and gain insights into new problems.

There is a generally accepted belief in some studies, that questioning, especially higher cognitive questioning, is an essential ingredient of enquiry and discovery and should consequently be fostered in science education (Gall, 1970; Winne, 1979).

Lemlech (1990) has asserted that an enquiry classroom

is characterised by its ability to sustain reflection. Students and teachers do not hurry to conclusion. At the same time, discussions tend to have a direct focus. Rather than focusing on the right answers, in the reflective discussion the teachers questions tend to act as a spring board for discussions. The questions probe instead of eliciting. They are therefore desirable in an enquiry classroom.

Summarising all the literature reviewed thus far on the enquiry methods, one would say that questioning skills are pertinent for any enquiry-oriented classroom.

2.0.6 Foods and Nutrition Curriculum

The Foods and Nutrition Curriculum in the Nigerian Senior Secondary School has the following objectives.

1. to prepare the students for home making and family life.
2. to prepare students for employment in occupations involving Home Economics knowledge and skills
3. To give them pre-professional education in the subject.

The distribution of content into years as shown in Appendix VI of the study was obtained from the National

Curriculum for Senior Secondary School Vol. II Home Economics Federal Ministry of Education (1985).

It is pertinent to note that most of the performance objectives as stipulated in the curriculum of year one was based on knowledge and comprehension level of Blooms' taxonomy e.g. define, describe, explain, identify, list etc. (see appendix VI Year 1 unit one) only two application level with two synthesis level performance objective was used. But in unit 3 of Year 1 most of the performance objectives were stated at the analysis, synthesis and evaluation levels of Bloom taxonomy. This implies that more higher cognitive questions are to be asked by Foods and Nutrition teachers in teaching this unit.

In Year 2, Unit 2 (see appendix IV) almost all the performance objectives were stated at the higher cognitive levels (analysis, synthesis and evaluation). Only few knowledge and comprehension performance objective were stated. This observation applies to unit 2 and 3 of Year 3 content.

Hence, secondary school teachers teaching Foods and Nutrition at the SS III levels are to use higher cognitive questioning levels so as to develop critical thinking in the minds of the students. One way by which this can be

achieved is through the use of appropriate questions based on the performance objective as stated in the curriculum.

2.1 Wait-Time Studies

Wait-time was defined by Rowe (1974) as the amount of time that a teacher has to wait after a question is asked before accepting an answer, repeating the question, rephrasing the question or supplying the answer. Rowe discovered that the quality of a classroom discourse may be very much related to the duration of pauses separating the teacher's question and students response. According to her, even when a teacher has mastered the skills of questioning and is teaching a highly receptive class, the teacher's questioning style may result in little or no learning if he/she fails to make proper use of wait-time.

Lake (1973) defined wait-time as the length of pause preceding any teacher utterance. Lake has a broader view of wait-time, in that it includes every pause the teacher makes, not only after a question but after any teacher utterance. However, for this research, Rowe's definition is adopted, since her definition is restricted to question time only.

There are two types of wait-time: Wait-time I and

wait-time II. Wait-time 1 is defined as the length of time that a teacher pauses after a question. It normally begins when a teacher stops speaking and terminates when a student begins to respond or the teacher speaks again. The sequence is as follows: the teacher asks a question, pauses, calls a student and pauses until the student begins to respond. These two pauses constitute an instance of the first wait-time (Rowe, 1969).

Wait-time II is defined as the time a teacher waits after a pupil's response to either comment or ask another question. It is calculated by measuring the period from which a student stops responding to a question to when the teacher speaks again. These two wait-time(I&II) appear, to be critical variables in determining the ability of students and the interactions that go on in the classroom.

Questioning wait-time implies the period it take to respond to an interrogation. Tobin (1983:5) in an experimental study found that questioning wait-time was significantly related to science achievement. In another study on wait-time, Altiere and Dwell (1991) found that extending wait-time after higher cognitive level questions usually leads to behavioural changes among both teachers and students. Teachers who extend their wait-times to 3-5

seconds tend to:

1. show improved performance on higher cognitive level test questions (Tobin, 1984)
2. provide the teacher time to think over the answers given by the students and assess if they mean the same as what the teacher himself has in mind, and,
3. ask more pertinent topic-related questions (Samiroden, 1983).

Earlier Rowe (1974) stated that when the pace of instruction was slowed down, a number of desirable learning outcomes occur. These outcome included:

1. increased length of responses of students,
2. students offered more alternative responses and were less likely to fail to respond,
3. students asked more questions and interacted more with one another (Fowler, 1975) and
4. the number and quality of questions asked by the teacher improved.

These findings were evident in the increase in the number of higher cognitive questions that the teacher asked. Research studies conducted by Taba, Levine and Elzey (1964) and Hunking (1972) on the effect of questions on

students' achievement suggested that "higher order questions, questions which require thought rather than memory, increased students achievement" (Sadker and Sadker in Copper, 1977a:185). According to them, "in classes where higher order thought provoking questions are asked, pupils perform better on achievement test".

Similarly, research studies have shown that if a teacher can wait 3-5 seconds longer after asking a question (that is increased wait-time) this could enable the pupils to improve the quality and quantity of their responses. Rapid questions asked within a short period prevent many slow thinking pupils from responding to the teacher's questions. If the teacher increases his wait-time, pupils will ask more questions, make more inferences; use more evidences and derive more generalisations (Sadder and Sadker in Copper, 1977a:186).

Rowe (1974) and Tobin (1987) reported that when students were given three or more seconds of undisturbed "wait-time", there are certain positive outcomes:

1. The length and correctness of their responses increased.
2. The number of their "I don't know" and no answer responses decreased.

3. The number of volunteered, appropriate answers by larger numbers of students greatly increased.
4. The scores of students on academic achievement tests tend to increase.

When teachers waited patiently in silence for three or more seconds at appropriate places, positive changes in their own teacher behaviours also occurred:

1. Their questioning strategies tend to be more varied and flexible.
2. They decreased the quantity and increased the quality of their questions.
3. They asked additional questions that require more complex information processing and higher-level thinking on the part of students.

2.2.1 Review of Empirical Researches on Wait-time

Moriber (1971) conducted a research in Brooklyn College U.S.A. on teachers wait-time. The purpose of the study was to find how much wait-time college teachers provided for their students. He used four graduate instructors with 2-6 years teaching experience. The instructors were told that they be observed once a week, and that the purpose of the observation was to help them

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develop better training methods. The teachers were designated 1, 2, 3, 4 and questionnaires were used to find out how students rated them. The ratings revealed that teacher 1 was excellent, teacher 2 was very good, teachers 3 and 4 were fair. Each of these teachers taught a two-hour laboratory class to twenty second year college students and juniors enrolled in the second half of one- year physical science class for non-science students.

The first hour of each laboratory period was devoted to a structured lesson and the second hour to the actual student performance of the experiment. To determine wait-time, Moriber used Flander's categories for interaction analysis. This technique allows an observer to determine the qualitative and quantitative dimensions of teachers verbal behaviours in the classroom. In interaction analysis, one seeks to record series of arts that occur in the classroom so that during selected time intervals, one continuously records what is taking place within certain time interval. The results were tabulated based on the total number of interactions, that is questions and answers, which occurred within a certain time interval and these have been arranged in columns.

The first teacher was rated as the best by the

students. This is because the teacher gave a wait-time of less than two seconds. His teaching method was lecture method and when he asked questions, he immediately called on a student or accepted a response shouted. Teacher 3 rated as fair allowed students the most wait-time and asked most questions. Observations showed that teachers who gave longer wait-times did so generally due to poorly phrased ambiguous questions. Teacher 1 asked-provoking questions but immediately called on the first student who appeared to raise his hands and this resulted in the same student answering four or five questions in a row. Wait-time in this case was found to be about one second.

The study revealed that students give wrong answers when wait-time was under four seconds and this made the teacher reword the questions because it was believed that the first question was not clear. It turned out that the second question was not the same as the first question. This confused the students as they pondered which of the two questions they were supposed to answer. Moriber concluded that it was difficult to retrain teachers who had taught for as little as 4 to 5 years. He arrived at this conclusion when the teachers he used to find wait-time in college science could not increase their wait-time,

despite all the training.

Since the above study is on teachers wait-time, which is an aspect of the present study, it will be useful to compare the pattern of the responses with the findings of the present study.

Similarly, Rowe (1974) experimented on increasing wait-times. The purpose of the study was to find out the effect of the following factors on the verbal behaviours of students:

i) Increasing the period of time that a teacher waits for a student to construct a response to a question (wait-time I)

ii) Increasing the period of time that a teacher waits before replying to a student statement(wait-time II);

iii) Decreasing the amount of verbal reward and punishment delivered to students during discussions in which they are attempting to draw inferences from evidence or to explain the phenomenon.

Rowe used a group of teachers who willingly agreed to work with her and she used a stop watch to measure both wait-times, along with servo chart plotter which made a kind of picture of the discourse . The plotter pen was adjusted to move horizontally whenever there was a pause,

and vertically when there was a sound.

The results of her experiment revealed that when wait-time I is long, 3 seconds or more, a number of favourable outcomes results:

i) the length of students responses increased. Under a fast schedule (1-2 second or less) students responses tended to be short (about 6 to 10 words) and fragmented;

ii) when wait-time was increased; students made longer statements;

iii) the number of unsolicited but correct responses by the students increased;

iv) failure to response decreased. This was controlled more by the first wait- time;

v) confidence as reflected in fewer inflected responses increased. Under a fast schedule, students tended to give answers with question mark tone; as if to say to the teacher, 'Is that what you want ?' But this characteristic lack of confidence tended to decrease as wait-times are increased. The incidence of inflected speech was also high where verbal reward was high;

vi) the incidence of speculative thinking increased. This

was influenced by both wait- times I and II;

vii) the number of questions asked by the children increased and the number of experiments they proposed increase. Both wait-times were affected by this variable;

viii) contributions by "low" students increased under a fast schedule. Only particular groups of students answered questions in class. When wait-times were increased, responses came from many other students who would not normally talk.

The study additionally revealed that when wait-times are increased, certain teacher characteristics changed. These characteristics according to Rowe, are described as teacher outcome variables. Such variables include

a) teachers responses exhibited greater flexibility as indicated by the occurrence of fewer discourse errors. When wait-time was short, the teacher acted like a machine so that when he asked a question, if the students do not mention a particular word, the answer was said to be wrong. But with increased wait-time, the teacher had time to think over the answer given by the students and tried to see if it meant the same with what he had in mind;

b) the number and kinds of questions by the teacher changed with increased wait-times because the length of responses by students increased. The number of high cognitive questions also increased;

c) teacher expectations for the performances of certain children seemed to change when wait-time was increased. These students whom teachers rated as poor before the use of wait-time were found to be mixed up with those thought to be clever.

Rowe, however, did not report the actual size of teachers used for the study. In addition, the extent to which wait-time was increased or decreased was not stated. It must be noted that while Rowe's study investigated the effect of increased wait-time on students behaviour, the present study investigated whether teachers wait-time relate to and /or affect the academic achievement and career aspirations of students in foods and nutrition. However, some of the instruments used for measuring the wait-times of teachers in Rowes work would be used in the present study.

In another research conducted in Thailand, Chewprecha, Gardner and Sapianchai (1980) compared three training methods of modifying wait-time. The purpose of the study

was to find out which of the three self-training methods was most effective in developing teachers' questioning skills and which was most effective in developing the teachers wait-time II to 3-4 seconds. A pre-test post-test control group design was used. Teachers were made to record on tape the teaching of the same lessons. The type of questions asked were classified into high and low level cognitive questions, open-ended, as well as close-ended questions. Wait-time was measured using a stop-watch after each open-ended questions by trained raters and these were used as pre-test scores. The teachers were then given a two hour orientation on the importance of classroom questioning and wait-time. They were divided into three groups and were taught how to classify questions and measure wait-time. Group I was given instructional pamphlets. Group II received audio tape models, Group III received the same audio tape models and was asked to listen to, ask and tally questions appearing in the audio tape models.

The study revealed that even though perpetual models may be relatively expensive, studying instructional pamphlets and qualitative listening to audio tape models are effective methods of training teachers to modify their teaching behaviours. But studying instructional pamphlets

was found to be more effective in training teachers to acquire extended wait-time than qualitative analysis of audio tape. The authors noted that the success of the pamphlets was probably due to very limited access to books and articles on education in Thailand. Thus the pamphlets were read with high enthusiasm and the ideas were eagerly implemented.

While the above study measured the effectiveness of three self-training methods in developing teachers questioning abilities and wait-times, the present study investigated the effect of teachers wait-time and cognitive questioning levels on students achievement in foods and nutrition and their career aspirations. In addition, the report of Chewprecha's study did not indicate the number of teachers used for the study. Therefore, the generalisation of the study is constrained by the possibility that the size of the respondents may not be large enough to be representative of the total population. However, some of the instruments were used for measuring teachers wait-time, teachers questioning levels and the pre-test, post-test control group design would be used in the present study.

Tobin (1980) conducted a study on science achievements

with extended wait-times. The purpose of the study was to find out the effect of extended wait-time on science achievement. A sample size of 733 students of mixed ability in 23 intact classes in 11 Australian schools was used. The student's ages ranged from 10-13 years. It was not possible to randomly select schools because of the constraint imposed by the state Education Authority. To minimize interactions among teachers from different treatment groups, all participating teachers within a school were assigned to the same treatment groups. The same lessons were taught and students were divided into three treatment groups. The wait-time was recorded whenever a question was asked and an answer was provided and they were designated as follow:

1) A teacher utterance is followed by another teacher utterance (wait-time 1);

2) Child dialogue is followed by another teacher utterance (wait-time 11).

Discourse extraneous to the lesson objectives, such as discipline or classroom organisational moves, were not considered in the analysis. Before manipulating the variable of wait-time it was controlled at 0.5 seconds.

The result of the study revealed that the between mean

teacher wait-time and mean class achievement were close to zero. This means that there was no relationship between wait-time and science achievement in this phase of the study. However, when the effect of pre-treatment differences were considered using multiple regression analysis, the mean teacher wait-time was highly related to achievement test 3, and not related to test 2, the criterion tests. Tobin (1980) later reported a significant relationship between wait-time and science achievement for students in grade 5, 6 and 7. He concluded that extended teacher wait-time would lead to

higher achievement in science.

Since the above study investigated science achievement with extended wait-times, some part of the statistical techniques used to test the relationship between extended wait-times and science achievement may prove helpful while analyzing the present study.

Alteire and Duell (1991) studied how teachers can predict their students wait-time preferences. The subjects of the study were 679 students and 35 teachers. Two versions of science lessons were videotaped. The tapes different in the length of the pauses between the end of the teachers questions and her calling on a student. The

two copies of the tape had two different wait-time which were 3.0 seconds and 0.9 seconds. The lesson plan included three higher cognitive level questions. They were:

a) "Why is the earth divided into three layers?

b) Why does the earth behave like a giant bar magnet?

c) "If you went into a forest and fell asleep for a hundred years, what would you have to consider to get out of the forest again when you awake?

In the student's questionnaire, the students were asked to indicate the class they liked best, the class example in which students would learn more. After each preference item, the students checked "Yes or No" beside five possible reasons for each choice. The teachers questionnaire was different from the students' only in wording. The teachers predicted which tape version their classes chose in each of the three conditions and checked "Yes" or "No" to the five reasons for each prediction.

The study revealed that students preferred a taped lesson demonstrating extended wait time and their teacher accurately predicted this preference.

2.1.2 Wait Time Studies in Nigeria

Olajide (1986) conducted a study on wait-time and socio-cultural factors in an enquiry based integrated science classroom. The purpose of the study was to find out the average wait-time I and II of the Nigerian science teachers in Kaduna State. She tried to also find out if selected socio-cultural factors relate to the phenomenon of wait-time. The hypotheses of the study included:

1. There was no significant relationship between wait-time I given by Nigerian integrated science teachers and the selected socio-cultural factors.
2. There was no significant relationship between wait-time II given by integrated science teachers and the selected socio-cultural factors.

A purposive sampling procedure was employed for the study. Ten state and three non-state secondary schools in Zaria, Kaduna State were involved in the study. Only the integrated science teachers were used in each school. To assess the socio-cultural factors that affect wait-time, a total of eighty integrated science teachers from the sampled schools were served with questionnaires, though only sixty-five of them responded. A stop watch and tape recordings of lessons were used to collect data on wait-times, while Hough's (1966) observational instrument for

interaction analysis was used to determine the nature of interaction in the classroom. A total of 45 integrated science lessons were tape recorded from the sampled schools, each lasting 30 minutes on the average. Each lesson was played back later and categorised according to wait times I and II as earlier defined.

Olajide further used the Spearman rank order correlation was used to find the relationship between wait-time and socio-cultural factors. Other statistics used for the study included frequencies and percentages. The results of the study showed that:

i) The mean wait-time I for the integrated science teachers used for the study was 3.0 seconds while the mean wait-time II was 0.7 second. Thus wait-time I of integrated science teachers when compared to Gyuse's (1982) findings of 2.7 seconds for chemistry teachers suggest that the integrated science teachers wait longer for their questions to be answered.

ii) Respondents agreed that African cosmology (African beliefs about the universe) is associated with wait-time II but they were undecided on the influences of authoritarianism (favouring submission to authority rather than personal freedom), intellectual sacredness

(beliefs that science subject can only be understood by people who have attained certain level of intellect), goal structure and social expectation.

iii) Authoritarianism affects questioning.

iv) Socio-cultural factors such as authoritarianism, intellectual sacredness, societal expectation, goal structure and African cosmology showed no significant relationship with on wait-time I given by the integrated science teachers in Nigeria. This was first tested by correlating the compiled results of the socio-cultural instruments with wait-time I using Spearman's Brown correlation coefficient.

v) The results showed that wait-time I only correlated significantly with intellectual sacredness (r = 0.31) but did not correlate significantly with societal expectation (r = o,10) African cosmology (r = 0.27), authoritarianism (r = 0.06) and goal structure (r = 0.26).

vi) Wait-time II correlated significantly with authoritarianism (r = 0.34), societal expectation (r = 0.48), African cosmology (r = 0.31), goal structure (r = 0.32). The correlation for intellectual sacredness was not significant (r = 0.01).

vii) The correlation analysis for wait-time I and the five socio-cultural factors showed no significant relationship with authoritarianism, societal expectation, African cosmology and goal structure.

The results of the stepwise multiple regression analysis for wait-time II showed that societal expectation ranked first, followed by authoritarianism, then intellectual sacredness, goal structure and lastly African cosmology.

The weakness of Olajide's report is that most of the terms used in her report were not properly defined. Nor was the theoretical basis for the hypothesised relationships among socio-cultural factors and wait-times provided. However, since Olajide's report measured the mean wait-times of teachers, some of the instruments used were useful in the design of the present study.

Mu'azu (1991) studied the wait-time of social science teachers in some selected secondary schools in Zaria. The purpose of the study was to ascertain the mean wait-time I and II of social studies teachers and to compare the mean wait-times I and II of the teachers of different sexes, teaching experience, qualification and teachers' states of origin. The hypotheses of the study included:

1. There were no significant difference in the mean wait-times I and II of female and male teachers.
2. There was no significant difference in the mean wait-time of N.C.E and graduate teachers
3. There were no significant difference in the mean wait-times I and II of social studies teachers with teaching qualification and those with no teaching qualification.
4. Years of teaching experience among social studies teachers have no significant difference on their mean wait-times I and II.
5. Differences in states of origin among social studies teachers have no significant effect on their mean wait-times I and II.

A purposive sampling of seven state owned and three non-state schools were involved in the study. The instruments used was a stop watch to measure wait-times I and II of social studies teachers, while a tape recorder was used to record social studies lessons. A total of 40 social science teachers from the sampled schools were given questionnaires to identify their sexes, qualifications, years of teaching experience and states of origin.

The un-correlated T-test statistics was used for

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hypotheses one and two. The third and fourth hypotheses were tested using ANOVA.

The results of Mu'azu's study revealed that:

i) The average mean wait-times I and II of social science teachers were 2.6 and 1.3 seconds respectively. These results compared to Olajide's and Gyuse's findings showed that social science teachers unlike the physics, integrated science and chemistry teachers had shorter wait-times. However, social science teachers wait-time II of 1.3 seconds is longer than that of integrated science teachers of 0.7 seconds.

ii) There was a significant differences in the mean wait-time I of teachers with and teachers without teaching qualification. Mu'azu recommended that teachers should be trained to use the skills of questioning with the proper use of wait-time.

The weaknesses of the study lies in the fact that it did not indicate the number of times the teachers were observed. Also some variables of the study such as the state of origins of the teachers would appear irrelevant to wait-time studies. However, some of the instruments and findings of Mu'azu's work were useful in designing and discussing the present study.

Onyabe (1995) conducted a study on the relationship between Wait-time and students verbal behaviour in integrated science classroom. The purpose of the study was to find out the average wait-time of integrated science teachers. She tried to find out the effect of wait-time on students achievement in integrated science. The hypothesis of the study included:

1) there is no significant relationship between teachers wait-time and students verbal behaviour,
2) there is no significant relationship between teachers wait-time and students achievement in integrated science.

A sample size of 400 JSS 11 students from ten sampled school in Sabon Gari, Zaria and Soba Local government areas with ten integrated science teachers were used. One teacher was selected from each of the ten sampled schools. All the teachers chosen for the study have been teaching integrated science for a minimum of three years and above. The instrument used for the study included the stop watch to measure teachers wait-time, a tape recorder, John Hough instrument for determining the verbal behaviour of integrated science students achievement. Pearson product-moment correlation coefficient and T- test statistics was

used.

The result of her study showed that:

i) The mean wait-time 1 for Integrated science teachers used for the study was 3.75 seconds, while the mean wait-time 11 was 1.84 seconds. Thus wait-time 1 of integrated science teachers when compared to Olajide (1986) findings of 3.0 seconds for integrated science teacher suggest that the integrated science wait-time had increased from 3.0 to 3.75 in 1995. These results are also contrary to that of Muazu (1991) who observed that the average wait-time 1 and 11 of social science teachers to be 2.6 second and 1.3 second respectively.

ii) There is positive significant relationship between wait-time and students verbal behaviour.

iii) Wait-time 1 has significant relationship with the academic achievement in integrated science, while wait-time 11 has inverse significant relationship with academic achievement in integrated science. This implies that the higher the wait-time 11 of the teachers the less achievement of the students.

The weakness in Onyabe's study is that she did not categorically state the time given to teachers to teach the digestive and respiratory system before administering the test items. In addition, she did not use trained observers to help her closely monitor students verbal behaviour during classroom interactions.

However, the above study is relevant to the present study since it investigated teachers wait-time duration and students achievement. It must be noted that while Ogunniyi (1981) worked on classroom interactions relative to teacher-student questioning behaviours. Gyuse (1982), investigated the questioning patterns of Physics teachers in secondary schools. Olajide(1986) studied integrated science wait-time and socio-cultural factors. Similarly, Mua`zu (1991) studied social science teachers wait-time. The present study however investigated the effect of teachers wait -time and cognitive questioning levels on students achievement in foods and nutrition and their career aspirations.

2.3 Effects of questioning on Achievements

2.3.1 Achievement in Senior Secondary Schools

According to Cronbach (1974) the academic achievement of students in a normal classroom is not always the same.

Some students perform very well, some averagely, while others perform very poorly. Those who perform very well in tests, assignments and examinations are usually classified as high achievers, while those who perform poorly are referred to as the low achievers. The average achievers are students whose academic performance are neither high nor low.

The major factors responsible for the inequality of students scholastic performance could be classified into three major categories (Wheleman, 1979). These factors are according to Whileman, those relating to home background, those relating to facilities and curricular, and those relating to teachers characteristics. Whileman concluded that the teacher factor is one of the most important factor which can influence the academic achievement of students. Teachers who provide good classroom conditions, good teacher-student relationship and of course good teaching styles with effective wait-time questioning skills may improve the academic achievement of students.

For the purpose of this study, these students who score 50 percent and above in tests items of foods and nutrition designed by the researcher are regarded as pass work while anything below 50 was regarded as failed.

Thus achievement in this context is referred to as the academic achievement of students in foods and nutrition test-items prepared and validated by the researcher.

Omar (1981) investigated the effects on instruction and personal traits of Saudi pre-service science teachers of the use of higher cognitive questions. The purpose of the study was to investigate the effects of two levels of practice in questioning (programme instruction in question classification supplemented by micro teaching practice and programmed instruction alone). He wanted to determine which of the programmes could produce teachers who would use significantly more higher level questions in their teachings. An attempt was made to determine if the instructional programmes developed would have a different effect on open and close minded persons in their use of higher level questions.

In order to measure teacher performances in question classification, a question classification test (QCT) based on Bloom's taxonomy was constructed, validated and translated into Arabic. The translated version was reliable at .77 and .78 on split-half and test-retest methods respectively. The validated Arabic version (r = .87) or the Rokeach Dogmatism scale (RDS) form was used to measure

open- and close- mindedness. Forty five students of the Science and Mathematics Centre, Riyadh, Saudi Arabia, were randomly divided into three groups of 15 subjects each. All subject were pre-tested with the QCT and RDS. In 5 weekly three-hour sessions, both experimental groups received interactive programmed instruction in questioning and participated in discussions of the value of questioning in developing critical thinking. Following the programmed instruction, the first experimental group participated in micro-teaching for three weeks in teach-evaluate-reteach sequences. The second group listened to three audio-taped lessons and engaged in evaluation processes for these weeks. The post-test QCT was administered in the last session during the tenth week. After three weeks of students teaching, recording of classes were made on audio-cassettes which were later analyzed by three independent raters. Data was analyzed by one-way analysis of variance, analyses of covariance and 3 x 3 analysis of covariance with planned independent comparisons, to study the main and interactive effects of the three treatments and the three levels of dogmatism. A Pearson product-moment correlation was used to measure the relationship between the post-test QCT and the percentage of higher questions used.

The result of the study revealed that the three groups were from the same population. Post-test scores showed significant differences among groups but few intra-group differences in the experimental groups. The study indicated that the use of a practice-oriented instructional programme positively affects the questioning behaviour of the subjects, as observed by their high achievement on the post-test QCT as well as the increase in the number of higher level questions used. The two instructional methods used in this study did not have significant different effects on the percentage of higher level questions used. Micro-teaching questions used did not significantly reinforce positive changes in the questioning behaviour of the subjects.

Both high and low level dogmatic subjects from the two experimental groups used significantly more higher level questions than control group subjects. Similarly, they scored significantly higher on the post test QCT than the control group subjects. Nevertheless, intra-group difference in dogmatism were present. The significant positive correlation between post-test scores and the percentage of higher level questions indicated that the questioning behaviour of pre-service science teachers may

be significantly and positively changed as a result of appropriate instructions in questioning as applied in this study.

Omar did not report the specific number of teachers in each of the experimental groups and it must be noted that only higher cognitive questions were used for the study. However, the treatment procedure and the instrument(audio cassettes) used for the study were useful in the design of the present study.

Riley (1978) studied the effects of studying a question classification system on the cognitive level of preservice teachers question. The purpose of the study was to determine whether learning a question classification hierarchy would result in teachers asking higher cognitive-level questions in the classroom. Riley used the new science curriculum (SAPA) and a text series concepts in science (CIS) on the cognitive level and a number of teachers question.

The hypotheses of the study were:

1. There is no difference in the question classification ability of preservice elementary teachers as measured by the science questions classification test (SQCT) owing to effects of training in question

classification.

2. There is no difference in the (a) cognitive level or (b) number of questions asked by preservice teachers, as measured by the QCSS owing to the effects of question classification training.
3. There is no difference in the (a) cognitive level and (b) number of questions asked by preservice teachers as measured by the QCSS owing to the effects of the science curriculum used.
4. There is no significant interaction between treatment and science curriculum on the (a) cognitive level or (b) number of questions asked by preservice teachers as measured by the QCSS.

The instruments used for Riley's study include:

1. Science Question Classification Test (SQCT) developed by Riley to measure the preservice teacher's ability to recognise different cognitive levels of question.
2. Cognitive level of teacher's questions using audio tapes for 30 minutes science lesson were taken for each subject and then the total number of questions were asked by the teacher during the 30 minutes tape.

The sample of the study comprised 100 senior level preserve elementary teachers enrolled in the undergraduate

program at the University of Delaware. Forty of these students were randomly selected and assigned to the two treatment level and to schools using different curriculum program.

The treatment levels are the questioning classification was given to students in this group for 3 1/2 hours for instruction in classifying questions. Training consisted of studying the question category system for science (QCSS) and then using this system to classify question as cognitive memory, convergent thinking, divergent thinking, evaluating thinking or non-thinking. Students worked through each level by reading a description of the category and examples of questions in that category. They were allowed to practice classification of questions with examples. The control group received no training in classifying questions. Class time was spent on other aspects of science education.

The 2 x 2 factorial design was used and the subjects of the study were assigned to teach in two schools. The data was analysed using t-test procedures and Analysis of variance. The result of Riley's study revealed that:

1. Training teachers in the QCSS resulted in a significant shift towards higher cognitive level

questions.

2. The mean cognitive level of questions asked by trained teachers was significantly higher than the mean of the control group.
3. There was no significant difference between treatment and control groups on the number of questions asked.
4. The questions of teachers using the SAPA curriculum received a mean cognitive level score significantly higher than did the questions asked by teachers using the CIS textbook.
5. The SAPA teachers asked significantly fewer questions than did those using CIS.

From these results Riley concluded that training in the meaning and use of a classification hierarchy such as the QCSS can be employed to raise the cognitive level of questions asked by preservice teachers. The results also indicated that the curriculum being used can have effect on the cognitive level and number of questions a teacher asks.

Riley's study particularly, the treatment and some of the instruments used were useful in the methodology of the present study.

Riley (1986) investigated the effect of teachers wait-time and knowledge and comprehension question on

science achievement. The purpose of the experiment study was to find out the effects of varied teacher Wait-time duration and cognitive questioning levels on students achievement. The hypotheses of the study were.

1) There was no difference in students science achievements due or related to the effects of cognitive levels of teachers question.
2) There was no difference in students science achievements due or related to the effects of wait-time.
3) There was no significant interaction between wait-time and cognitive levels of teachers question.

The design required a two-space sampling procedure. Thirty pre-service teachers were randomly assigned to treatments. The pre-service teachers then randomly selected five elementary pupils from their assigned classrooms. This was the first intern experience for the pre-service teachers and because of this, they were only allowed to work with small groups.

The treatment procedure involved the thirty teachers being assigned scripted lessons containing specific question and wait-time. The cognitive levels of the questions used in the lessons were classified as

comprehension, knowledge or a 50/50 combination.

The research literature on wait-time has suggested the existence of a mean wait-time threshold of between 3 and 4.5 seconds. Wait-time falling outside this range were thought to have no detectable changes in the levels of outcome variables.

The wait-time for this study were assigned at 1, 3 and 5 seconds to test mean wait-times both in and out of the hypothesized threshold. Mini-lesson containing explicit measurable objectives suitable for 15-30 minutes were given to the teachers. They were also provided an hour practise session to familiarize themselves with increased wait-time. Working with a peer, they audio-taped themselves and measured their relative wait-time using a stop watch. The instruments graphically received a speakers voice pattern and allowed pauses between utterance to be measured with an accuracy of one-tenth of a second. An estimate of wait-time was obtained for each teacher by covering all the question asked . Discriminant analysis of the data indicated that eight of the 26 teachers were misclassified based on their actual wait-time. For analysis purpose, criterion measures of the misclassified teachers were reassigned to the proper groups as determined by the discriminant analysis data; The

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observed average wait-time for the assigned one, three and five seconds groups were actually 1.17, 3.35 and 5.9 seconds respectively.

For the criterion instrument, a 25-item achievements test was administered to students at the end of the lesson; fifteen of the question were taken from the post test provided with the Popham teaching improvements kit. These question were judge by a panel of experts to be measuring at the comprehension levels of Blooms Taxonomy, Ten additional items were constructed at the knowledge levels. Reliability was determined using split half procedure and found to be 0.87 for the total test. The reliabilities for the sub-test were: knowledge = 0.85 and comprehension = 0.79. A 3x3 factorial design with all factors fixed was used to analyze the data for differences in group means and significant interactions. Analyses of variance was used to detect differences among the means. All hypothesis testing and post-hoc analyses were done at the 0.05 levels of significance.

The result of Riley's study revealed the following:

1) There was strong evidence of a non-chance difference attitude to the use of a fifty percent combination of high and cognitive questions. Students in this group

scored significantly higher achievement than did students in the one hundred percent high and one hundred percent low cognitive questioning group.

2) Teachers could improve student acquisition of science comprehension objectives by asking a combination of knowledge and comprehension questions

3) Learners derived more benefit from the combination of these cognitive level questions than from exclusive use of these cognitive level question than from exclusive use of either one of them.

4) The study was unable to find differences attributable to the use of varying cognitive questioning levels on the knowledge sub test.

5) Unbiased estimate of the treatment effects on the comprehension sub-test support the research hypothesis that wait-time influences students achievement. These findings are congruent with those reported by Tobin(1980) indicating that the use of extended wait-time will lead to higher science achievement .

6) The result of the main effect (Wait-time) indicated that, on the test measuring science comprehension objectives, the longer the teacher wait-time, the greater the student achievements.

7) The results indicated that wait-time, beyond the three seconds threshold identified in literature, can have positive effects on students comprehension.

8) No significant difference in achievements due to wait-time could be identified on the knowledge level test.

In summary, the results of Riley's work indicate that the achievement of comprehension level questions, a combination of low and high cognitive level questions with long wait-time would be more effective than the other tested levels of questioning and wait-time duration.

The above study is relevant to the present study since it investigated teachers' wait-time duration and questioning levels.(two levels in this case) on science achievement. It must be noted that while Moriber(1971) worked on wait-time duration of teachers in relation to students response to questions, Rowe(1974) and Tobins(1980) worked on extended wait-time as it affects students achievement in science. Similarly, Chewprecha et al (1980) compared three-training methods of modifying wait-time using pre-test and post-test control group design. On the other hand, Omar (1981) worked on the effect of higher cognitive questions on pre-service teachers using Bloom's taxonomy. The present study however, investigated the

effect of teachers wait-time and cognitive questioning levels on student achievement in foods and nutrition and their career aspiration. The present researcher used all the six levels of Bloom's taxonomy .some portions of the instruments and treatment procedure employed by Riley (1986) were adopted in the methodology of the present study.

Ogunniyi (1981) who conducted a study on classroom interactions relative to teacher-student questioning behaviours. The purpose of the study was to find out whether teachers were aware of the need to raise questions in teaching, what types of questions and what pattern of questions teachers used during science instruction. The methodology employed for the study involved 24 secondary school teachers, who were randomly selected from Ibadan municipality. The teachers were observed by three trained observers for a period of one month. Rowe's questions categories viz: memory, information, rhetorical, leading and probing were used. Classroom observations and tape recordings were made.

The result of the study revealed the following:-

1. Science teachers involved in the study used mainly informational and memory questions in their

instructions, with the exception of physics teachers who used only a few leading and probing questions.

2. Biology teachers used more memory questions than Chemistry and Physics teachers. Also Biology teachers used the least number of rhetorical questions in their teaching.
3. Students asked mainly informational questions. They asked more questions during laboratory periods than classroom lessons.
4. Science teachers asked more questions than their students.
5. Biology and Physics teachers tend to ask more questions during the middle and later part of a lesson. Chemistry teachers on the other hand asked a relatively evenly distributed number of questions throughout the lesson.
6. Physics teachers asked the highest number of questions, followed by Chemistry teachers and lastly Biology teachers.

Ogunniyi observed that the use of mainly informational and rhetorical questions in instruction by science teachers tended to prevent students from developing higher level of cognitive ability. He observed that in spite of the

emphasis of the new science curricula on critical thinking and higher cognitive objectives, the teachers involved in the study persisted in using mainly factual and rhetorical questions.

Ogunniyi's study did not categorically mention the number of teachers used per subject area: Biology, Chemistry and Physics. The number of times each teacher was observed was also not uniform across subject areas. However, Ogunniyi's report investigated teachers questioning behaviour, which is similar to one of the variables of the present study. Thus some of Ogunniyi's findings were useful in discussing the present study.

Similarly, Gyuse (1982) investigated the questioning patterns of Physics teachers in Secondary Schools in Nigeria. The purpose of the study was to find out the number of questions, the type of questions and the amount of time teachers wait for a response to be made to their questions.

In selecting the subjects used for the study, the teacher randomly selected eight teachers from a selection of twenty teachers: four Chemistry and four Physics teachers. Her reason for doing so was that it was not practicable to study all the teachers because of the

methodology adapted in collecting data. She therefore used a smaller number but dealt with it more intensely and into a greater depth. All the teachers used were found to be graduate teachers with two to three years of teaching experience. Two teachers had a Bachelor of Education degree while the other two were graduates only in their teaching subjects.

The sources of data were by tape recording of whole lessons of teachers, direct observations and through informal interviews with teachers after the last lessons. This method, according to Gyuse, allowed more accurate information on the questioning practice than the usual approach of using questionnaires or interviews alone. These later approaches, while allowing large samples, leave the researcher at the mercy of the teachers recall and willingness to answer questions accurately.

Four separate lessons of 55 minutes duration on different topics were tape-recorded for each teacher. Permission to tape record science lessons was requested at the first meeting. However, care was taken to ensure recording typical of teachers questioning style by neither informing the teachers of the purpose of recording their lessons nor the topics to teach. Normal lessons, as were on

the school scheme of work, were recorded. No topic was recorded more than once for each teacher. Visits to the classes were at random and covered a period of five months.

Data analysis was done by replaying each of the 32 lessons and while listening to the tape recording. All the questions asked by the teachers were listed and categorized, using the following classification levels.

1. Classroom routine questions.
2. Memory knowledge questions.
3. Comprehension questions.
4. Application questions.
5. Evaluation questions.

A stop clock was used to measure the wait-time of the 32 lessons, seven of them were practical, while 25 were theory lessons.

Gyuse found out that:

i) there was very little variation between physics and chemistry teachers' questions;

ii) the number of questions vary among teachers but the types do not;

iii very few higher level questions were asked but teachers asked more memory and classroom routine questions than any other types. This finding agrees

with Ogunniyi (1981) findings;

iv) teachers do not wait long enough for their questions to be answered. Chemistry teachers generally have a longer wait-time (approximately 2.7 seconds) than physics teachers who have approximately 2.0 seconds;

v) none of the teachers had an average wait-time of less than one second, which according to Rowe (1970, 1974) was the average wait-time for science teachers in the United States. On the other hand, none of the teachers attained the wait-time of 5 seconds;

vi) teachers with longer years of teaching experiences tended to have longer wait-time;

vii) the two trained teachers (i.e. teachers with Bachelor of Education degree) had a better distribution of questions.

Gyuse's report did not categorically spell out the assumptions nor the hypotheses of the study, though some of the variables in her report(that is wait-time and teachers' questions) are variables which the present study examined. However, the present study unlike Gyuse study, investigated the effect of these variables on students' achievement and their career aspiration. Thus, some of the instruments and procedure used in measuring teachers wait-time and

questioning behaviours guided the design of the present study.

2.4 Effects of Achievement on Career Aspiration

Career aspirations as earlier defined is the desire one has in his or her occupational advancement. Aspiration is formulated solely in terms of individuals wants and wishes In short, career aspiration is what work/career the individual thinks he/she would do in future.

Importantly, individuals interest capacities, values and opportunities are compromised to give the desired career. However, in an attempt to review the related literature on students career aspiration, it is pertinent to take a step backwards to some theoretical framework of occupational choice. The theories discussed are those postulated by the following:

Trait and Factor theory.

Ginzberg's life stage theory

Super's developmental self concept theory.

O'Hara's theory of development.

2.4.1 Trait and Factor Theory

According to Larry and Ronald(1973) the trait and factor theory was the forerunner of all modern theories of occupational choice and still dictates much of the current

practice of vocational guidance. The origin of trait and factor theory is traceable to Person's(1909) three-step process of:

1) a clear understanding of self;
2) a knowledge of the requirement and conditions of various occupations
3) "true reasoning" between the two sets of information.

In other words, the individual compares his abilities with those demanded by the occupation and agrees on the one he matches best. The labelling of this method as trait and factor theory according to two of its fundamental tenets: that the individual is organised in terms of unique patterns of capabilities and potentials (traits) and that can be described in terms of homogeneous qualities(factors).

The dangers of over-reliance on trait and factor methods are: it narrows perspectives on the study of individual occupations and the use of various types of aptitude, intelligence, interest and personality tests to predict success in an occupation. The use of such test in a counselling situation may provide useful data for a qualified counsellor, but the predictions of an individual's future life work should not be based upon test

results alone.

2.4.2 Ginzberg's Life Stage Theory

Ginzberg (1951) and his associates theorize that occupational choice behaviours according to the fantasy, tentative and realistic periods. The choice behaviours in terms of the three periods are:-

1. In fantasy period (0-11 years)

The individual is thought through a period of fantasy. At this stage Ginzberg's mentioned that the youngster thinks about an occupation in terms of his wish to be an adult, without necessarily assessing his capacities and limitations. The youngsters believes that he/she can be whatever he/she wishes to be. The youngster fantasy choices are based on anticipatory pleasure (Miller, 1968).

2. Tentative period (11-18 years)

Ginzberg and his associates maintain that the youngster's translation of future satisfaction is exclusively based on subjective factors i.e. interest, capacities and values. Here the individual tries to weigh various satisfactions based on his values and goals.

3. Realistic period (18-24 years)

This is a period whereby an individual makes compromise between his wants and the actual opportunities that exist. This period is therefore characterised by impact of realistic considerations on the decision making process. However, in 1972 Ginzberg and his associates modified their theory and proposed that:

a) occupational choice is a process that remains open as long as one makes and expects to make decision about his/her work and career;

b) the successive decision that a young person makes during the preparatory period will have a shaping influence on the individuals later career, so also will the continuous changes that individuals' in work or life;

c) peoples make decisions about careers and jobs with the aim that they optimize their satisfactions between their priority needs and desires and the opportunities and constraints that they confront in the world.

In essence, Ginzberg's theory of occupational choice is not a single decision, but a developmental process which takes over a minimum of six-seven years and more typically, over ten or more years. And that the process is largely irreversible. The process of occupational choice ends in a

compromise.

2.4.4 Super's Development Self Theory.

Super (1953) formulated a comprehensive theory of vocational development. He criticized Ginzberg's theory of occupational choice because according to Super, Ginzberg's theory failed to take into account the continuity of the development of preferences, and the difference in the stages, choice, entry and adjustment. It should explain the process through which interest, capacities, values and opportunities are compromised (Super, 1953).

Super developed his theory by identifying the following elements in the development process;

1) People differ in their abilities, interest and personalities.
2) They are qualified, by virtue of these characteristics, each for a number of occupations.
3) This process may be summed up in a series of life stages.
4) Development through the life stage can be guided.
5) The process of vocational development is essentially that of developing and implementing a self-concept.
6) The nature of the career pattern (that is the occupational level attained and the sequence,

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frequency, and duration of trail and stable jobs) is determine by the individual's parental socioeconomic level, mental ability and personality characteristics, and by the opportunities to which he is exposed.

7) The process of compromise between individual and social factors, between self concept and reality is one of role playing:

8) Work satisfactions and life satisfaction depend upon the extent to which the individual finds adequate outlets for his abilities, interest personalities traits and values (Super 1963).

In other works, Super(1963) viewed an individual's occupational preference as an attempt to implement a self-concept. He maintained that a person selects an occupation which requirements provide a role consistent with his self image. The process of forming a concept of self begins in infancy which is essentially an exploratory process which goes on throughout the entire course of life (super 1963). Both Ginzberg and Super seem to agree that the process of occupational decision making and vocational development can be summed up in a series of life stages or period.

Super's theory relates to the present study because it says that the development of occupational preferences can

be guided and that individuals ability and exposure would form the bases for decision making in choosing an occupation. The present study sought to find out the effects of teachers wait-time and cognitive questioning levels on students achievement and their career aspiration.

2.4.5 O'Hara's Theory of career development.

O'Hara (1968) outlined a theoretical approach which viewed career development as a learning process. The major assumption guiding the learning theory approach was that the determinants of occupational selection are not just random behaviour; they are learned behaviours. According to O'Hara in order for vocational learning to take place a proper learning environment is required. The adolescent should be helped to understand the relationship among variables involved in career development such as interest, aptitudes and values. The complex nature of career development itself eg. vocational life stages, irreversibility and compromise as postulated by Ginzberg's and his associates should be presented to the student in a learning situation in such a way that he can comprehend it.

O'hara reasoned that changes in vocational behaviour are the result of cognitive changes that pupils are exposed to during classroom interactions. For examples, boys and

girls learn how to be doctors, electricians, teachers and nutritionist etc as a result of an understanding of the intimate relationship between education and occupation. Similarly, a vocabulary of occupational terms, as well as various pictorial and auditory symbols can be presented to help the students explore the world of work. This approach according to O'Hara does not detract from the importance of affective and psychomotor learning but merely recognised that a core of cognitive materials is required to make intelligent occupation decisions.

The essence of O'Hara's theoretical approach is that the career development of students can be facilitated by involving them in various learning situation which have occupational implications. For example, it can be inferred that some people will be proficient with peculiar teaching and learning styles than others depending on their exposure to the learning styles and thus they will perform better than those that are not exposed. eg if a student is taught to be involved in critical thinking with enough time(wait-time) and higher cognitive level questions, such students might be more academically oriented in their pursuit for future career. The present study relates to O'Hara's theory since it investigated the effect of teacher's Wait-time and

cognitive questioning levels on student's achievement in Foods and Nutrition and their career development.

Salton (1980) was of the view that certain students make a cognitive connection between academic ability and self worth. Students believe that their works as human beings depend on the amount of ability they possess and that their performance on achievement task will demonstrate their level of ability. It is therefore necessary that when students begin secondary school education they should be involved in the activities of the exploratory stage of vocational development. These activities could consist primarily of gathering information about one self and the occupational world. The key role of the teacher here is to set enquiry questions that will engage the minds of the students into critical thinking. Teachers should also have the potential to infuse into the regular subject matter a career education content. In addition they should equip student with the skill necessary to cope with transition from studies to workplace and vice versa. The present researcher feels that this could be done with proper use of wait-time and higher cognitive questioning skills.

However, O'Hara's theoretical approach was adapted for the present study since it is concerned with the cognitive

changes that pupils are exposed during classroom interaction and career development.

In summary the above theories presented in the proceeding discussions are attempts to find precisely what happens when an individual chooses an occupation. All the theories discussed display major similarities and suggest that the choice of an occupation is as a result of several interactions of sociological and environmental factors. The theories also emphasised some kinds of critical agents and periods. The major differences between the theories are differences of emphasis. The researcher is of the view that the theories discussed would serve as a valuable orientation for the practitioner and offer a comprehensive consideration of the range of variables involved in occupational decision making. The issue is not whether to accept the theory or not, but rather how to apply knowledge of the theories to the solution of classrooms and guidance problems.

Finally, it may be concluded that teachers have a great role to play in shaping out students potentials towards what he or she would become in future, particularly during classrooms interactions. There is a little literature reported on Foods and Nutrition students career

aspirations.

On career aspirations in Nigeria, Durojaiye (1970) conducted a study on school education and occupational choice. The purpose of his study was to find out pupils educational aspirations. He randomly selected 196 form 1-6 students at the International Secondary School, University of Ibadan, Nigeria. His sample comprised of 50 percent Nigeria and 50 percent foreign students. A questionnaire was used for his study. The result of the study showed that about 99.5 percent chose occupations in the professional class, while only 0.5 percent(one Nigerian)said they would trade. It also revealed that 66.3 per-cent of the pupils were motivated by professional and academic reasons per se, 17.9 per-cent based their choice purely on humanitarian and patriotic grounds. The report revealed that many of the pupils admitted that their parents had explicitly expressed opinions about occupational prospects. Forty-six per-cent mentioned their parents influenced their occupational choice, while only 5.6 percent mentioned teachers influence. According to Durojaiye, if the academic requirements of many of these professions (e.g. teaching, medicines, engineering, geology, etc) are to be compared to the academic adequacy of many of the pupils, a conclusion

might be reached that occupational choices of these pupils are unrealistic.

Since the above study is on school educational and occupational choice which is an aspect of the present study, it will be useful to compare the pattern of responses with the findings of the present study.

In another study, Denga (1975) investigated the relationship between the students' potential and their career aspirations in North Central state of Nigeria. The purpose of the study was to find out whether or not a significant correlation exists between the aptitudes, interests and abilities on one hand, and the career preferences on the other hand. The hypothesis of the study were:

1) there is no significant correlation between the abilities, aptitudes and interests of the selected form III students and their career choices;
2) if the students' potential is appraised and they are supplied with appropriate vocational information, they are more likely to choose careers which will be competence;
3) youngsters can drift into unsuitable employment through ignorance, lack of knowledge about themselves,

due to wishful thinking, material attractions, wrong advice from parents and under government's control.

Denga used five randomly selected post-primary institutions from 16 post-primary schools institutions in North Central state. Two hundred students were selected randomly from the five schools. The instruments used for the study included the questionnaire backed up with oral interview, aptitude test and interest inventories. The questionnaire was designed to test the motivational factors for occupational preferences. Denga used Bakare's Motivation for Original Preference Scale(MOPS). This scale has been devised in 1977 to test the various factors that exert impact on the students' choice of career other than their potentials.

The result of Denga's study was that there were a significant differences between the students' aptitude and abilities on one hand and their career choice on the other. Many students made choices above their ability levels. The survey results have shown that vocational guidance services are painfully lacking. Students are not knowledgeable about their abilities, interests or aptitudes. Vocational information has exerted the least influence among the factors influencing the students' choice of career. The

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result of the study has also shown that the Government of the North Central state has some projected manpower demand in certain shortage fields and this must be met. And that women were inclined to choose between nursing and teaching the so called conventional occupations for women.

Aruwa (1979) investigated the vocational aspiration of S.S.1 and S.S.II students in some selected secondary schools in four Local Government areas in Benue state of Nigeria. The purpose of the study was to determine whether students course of study (Arts or Science) had any bearing on their choice of occupations; if the environment where occupational choice has been limited by the narrow nature of the economy influenced students vocational aspiration. Aruwa selected eight schools for the study with 427 students respondents. The instruments used for the study was a 21 item questionnaire titled secondary schools Students Vocational Aspiration Project patterned after earlier works in related fields (Napier, 1972; Bakare, 1975; Ikemefuna, 1975; Bello, 1976;) but modified to suit the need of the study.

The result of Aruwa's study revealed that:

1) Most students offer to go into occupations that are not related to their secondary schools courses and

would later discover that these occupations do not agree with their expectation and self-image;

2) There is an absence of guidance service programme in all the schools;

3) Students lack information about the world of work outside their immediate environment;

4) Students have relied at most time on their parents and other significant persons in their environment for information regarding occupation and occupational opportunities.

5) Many of the schools are still bugged by the idea of grammar-type oriented education programmes that the national out cry for recognition of the differences in roles, talent and opportunities after schooling remains a concept in these schools.

The weakness of Aruwa's work is that the sampling procedure employed to arrive at the number of schools and students sample was not indicated. However, some of the findings of Aruwa's work would be compared to the pattern of responses for the present study.

From the above studies it may be concluded that students generally lack information about the world of work outside their immediate environment. Hence the trend

these days is that students choose their career regardless of their abilities and interest. Their choices are based on the circumstances they find themselves. Educators have important challenges before the students. They need to:

1. Prepare young people to use the increased space time that will be available to them in an effective and meaningful way.
2. Equip students with skills necessary to cope with frequent transitions from one work place to another or from one occupation to another and from work to studies and vice versa.
3. Help individual to develop and maintain a sense of identity that will allow them to transcend the discontinuities, role conflicts and uncertainties that are likely to occur for increasing number of workers (Bruces and Flum, 1986).

The present study investigated the effects of teachers wait-time and questioning levels on students achievements in nutrition science and their career aspiration.

2.5 Summary.

The reviewed literature suggests that questioning plays on important role in the classroom and that questions

are essential ingredients of enquiry and discovery learning. The reviewed literature has highlighted the relationship between enquiry and wait-time. It was emphasised that there cannot be wait-time unless there are questions. The enquiry mind asks questions.

The review also highlighted the theories of career development and how each theorist emphasised the motivational factors that affect career choice. The theories discussed have displayed major similarities and suggest that any choice of an occupation is as a result of several interactions of sociological and environment factors. These interactions involve classroom interactions, as for example during the teaching/learning situation. The cognitive changes that students are exposed to help individuals make intelligent occupational decisions. All these are normally planned by the teacher. Thus most of the factors discussed in most of the theories reviewed relate to the present study, which investigated the effects of teachers wait-time and cognitive questioning levels on students achievement and their career aspiration. In addition, related studies carried on career aspiration were highlighted. Most of the instruments used were the vocational interest inventory scale, questionnaire,

Bakare's motivation for occupational preference scale, oral interview and aptitude test.

The methodologies and instruments used for measuring wait-times and questioning levels were also highlighted. Tape recorders, stop watches, Blooms Taxonomy, serve chart plotters, questionnaire and Flanders categories for interaction analysis were the main instruments used to collect data. For the experimental studies, most researchers used the pre-test, post-test control group design. Bloom's taxonomy was used to classify questions in the achievement test. The present study investigated the effects of teachers wait-time and cognitive questioning levels on students achievement and their career aspirations.

CHAPTER 3

METHODOLOGY AND RESEARCH PROCEDURE

The design and procedure for the study is discussed under the following sub-headings:

3.1 The Design

3.2 The Population

3.3 The Sample and Sampling Technique

3.4 The Instruments for data collection

3.5 The procedure for data collection

3.6 The procedure for data analysis

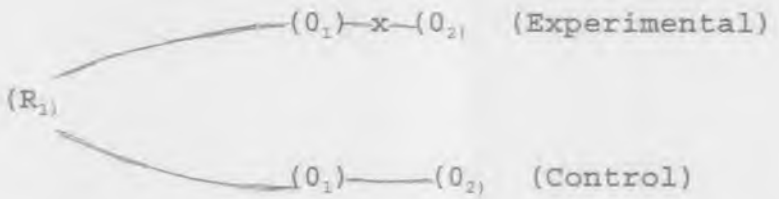
3.1 The Design

This research was designed to investigate the effect of teachers wait-time and cognitive questioning levels on students achievements in food and nutrition and their career aspirations. The researcher used both the survey method and the pre-test post-test control group design for the study. The survey method was used to determine the first two objectives of the study which aimed at determining the wait-time of foods and nutrition teachers and their cognitive questioning levels.

The pre-test past-test control group design was used to determine the effect of teachers wait-time and cogntive questioning levels on students achievement in foods and

nutrition and their career aspiration.

The pre-test post-test control group design is made up of an experimental group and a control group with randomised subjects.



In the experimental group the subjects were pre-tested before (O_1) then treated (x) and post tested (O_2) again at the end of the experiment, while in the control group the subjects were pretested (O_1) before and were not given any treatment but post tested (O_2) after the experiment. In other words, the control group is merely observed before and after the experiment. The researcher ensured that both the experiment and control group were matched before the commencement of the experimental study. The researcher obtained this during the survey study by determining the teachers qualification and years of teaching experience. Only teachers who had attained a wait-time of 2.7 with a first degree and has at least two years and above teaching experience was selected for the study. The researcher divided these category of teachers into two groups

(experiment and control groups). The researcher used secondary schools teachers in Kaduna North as the experimental group while secondary schools teachers in Zaria and Soba zones were used as the control group. The essence of having the control group outside Kaduna is to ensure that what was observed in the experimental group did not happen by mere chance. Thus to minimize interactions among teachers from the experimental and control groups, schools from Soba and Zaria LGA were used as the control group for the study.

3.2 The Population

A preliminary visit was made to the Educational Resource centre Zaria to determine the number of state secondary schools offering foods and nutrition in the senior secondary schools of Kaduna State. Similarly, the researcher visited the Directorate of Research, Planning and Statistics of the Ministry of Education Kaduna to determine the number of B.Ed Home Economics teachers. The table below shows the total number of schools and teachers offering foods and nutrition in Kaduna State.

Table 3.01: TOTAL NUMBER OF SCHOOLS AND TEACHERS OFFERING FOODS AND NUTRITION

ZONES	NO. OF SCHOOLS	NO. OF TEACHERS
Kaduna	10	83
Kafanchan	6	26
Zonkwa	5	20
Zaria	2	14
Lere	1	3
TOTAL	24	146

It was also discovered that Kaduna zone is subdivided into two zones - Kaduna North and South. Since this study is an experimental study. The researcher through random selection chose Kaduna North for the study. From the pilot study conducted, five secondary schools offer foods and nutrition in Kaduna North.

The population for this study comprised two groups:

1. All the two hundred SS III students offering foods and nutrition in Kaduna North and two hundred in Zaria.
2. All Home Economics teachers teaching foods and nutrition in Kaduna North.

3.3 The Sample

For the purpose of this study all the five secondary

schools from Kaduna North were used for the experimental study. These schools are Government Girls Secondary School Doka, Government Girls Secondary School, Kawo, GGSS Tafawa Balewa, GGSS Maimuna Gwarzo, and GGSS Independence Way, Kaduna. Sixteen teachers were randomly selected from these secondary schools. The reason for choosing these teachers for the study was because during the pilot study for this study these teachers had optimum wait time of 2.7 which is the average wait time for all the teachers from the five schools. Another reason is that all the teachers selected had first degree in Home Economics and had at least two years and above teaching experience. While all the students totalling 200 were used for the study. The reason for choosing all the students for the study is because with a relatively small population the best sample size is the population. See Table 3.02 for the number of teachers and students per school.

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TABLE 3.02 SHOWS THE DISTRIBUTION OF TEACHERS AND STUDENTS IN THE FIVE SECONDARY SCHOOLS

SCHOOLS	NO. OF TEACHERS	NO. OF STUDENTS
GGSS DOKA	3	40
GGSS KAWO	5	40
GGSS TAFAWA BALEWA	3	35
GGSS MAIMUNA GWARZO	2	45
GGSS INDEPENDENCE WAY	3	40
TOTAL	16	200

For the control group five secondary schools from Zaria, Kafanchan and Soba Local Government Areas were used for the study. Two hundred students and sixteen teachers of Foods and Nutrition were used as the control group. The same requirements for teachers qualification and teaching experiences was sought for the control group. This is to ensure that the two groups matched.

3.4 The Instrument

For the purpose of this study three types of instruments were used, namely:

1. Stop watch (Heuer track master Swiss made)
2. Mohammed' Food and Nutrition Achievement Instrument (MFATI)

3. Career Aspiration Test Scale (Bakare MOPS, 1977)

A random sample of three lessons of each teacher participating in the experiment was tape recorded. To measure the first objective of the study, the researcher used a stop watch to measure teacher's wait-time I and II. This is in accordance with Chewprecha's (1980) method of measuring wait time. The researcher play back recorded teachers lessons on foods and nutrition. The wait time I was measured by pressing the stop watch to start working as soon as the teacher finished asking a question. The stop watch was immediately stopped as soon as a student starts to respond to the teachers questions or when the teacher starts to repeat the questions. While wait time II was measured by pressing the stop watch to start working as soon as the students stops talking, and was pressed to stop working when the teacher starts to talk again.

The second objective of the study was measured by categorising recorded teachers questions while teaching foods and nutrition lessons. During the play back of the tapes, the researcher classified teachers cognitive questioning levels using Bloom's (1956) classification of questions as described in section 2.1 of the present study.

For the third objective, an achievement test (MFATI)

was designed by the researcher and administered to the students at the beginning (pre-test) and at the end (post-tested) of the training sessions for the treatment and control groups. The test items was constructed by the researcher based on the SSCE syllabus in Foods and Nutrition exclusively. Thirty test items were constructed for the SS III Foods and Nutrition students. See Appendix I. to obtain a standardised test, questions were tailored to WAEC past questions. The researcher set additional parallel questions using the table of specification (see appendix II). This table gives a spread of questions in a test, so as to give coverage and emphasis for each unit. The test was assessed by a panel of experts in Home Economics and Curriculum Development to ensure that they reflect the six levels of Bloom's taxonomy.

To measure students career aspirations the researcher used Bakare (1977) motivation for Occupational Preference Scale (MOPS) with some modifications. The three-part instrument covers the personal information about the respondents, their occupational preferences and the reasons for the respondents occupational preferences. Bakare's (MOPS)_ scale deals extensively with the third section giving reasons for occupational preferences. The details

of the proposed modification are given in Section 3.4.1. This instrument was administered to the students by the researcher at the beginning and the end of the training session for both the experimental and control groups.

3.4.1 Validation of Instruments

The test items, as well as the marking scheme for both the experiment and control groups were validated by experts drawn from Home Economics and Curriculum and Instruction Sections of Ahmadu Bello University, Zaria. Each member critically examined the test items for content validity and appropriateness for the senior secondary III students. The researcher revisited and corrected the test items based on the panel's recommendation before they were used for the study.

A pilot study using A.B.U. Zaria Demonstration Secondary School Home Economics Students and teachers was conducted. The purpose of the pilot study was to further assess the validity and administrability of the achievement test items as well as the other instruments.

The career aspiration scale was an adaptation of Bakare (MOPS) scale, which has been tested by her during the course of her study. However, some of the items on

Bakare scale was modified by the researcher to suit the present study. For example, the items on occupational preference was spelt out for the respondents to simply identify their occupational preferences. In addition, the second item on Bakare preferences (MOPS) has been replaced by asking the respondents to rank in order of preference their nutrition related occupational preferences. Some sections of Bakare's scales which were not relevant to the present study were omitted e.g. type of school, and parent's indirect influence. All other items in sections B, C, D of Bakare's scale were used for the present study.

3.4.2 Reliability of the Instrument

The reliability of the test items was established before the administration of the test items to the subject. The reliability test was determined using spilt half method with a sample of 30 Demonstration Secondary School Home Economics students. A reliability value of 0.86 was obtained for the test. When this value is compared with the critical value of

$r = 0.3494$ ($df = 30$, $p = 0.05$) it implies that the obtained reliability coefficient is significant. Hence, the test

item has a satisfactory reliability estimate. Therefore, the instrument is appropriate for gathering data for the study. While the reliability of Bakare's MOP Scale has been earlier determined by the use of a test-retest study of a sample of twenty eight Nigerian four secondary school pupils with a test-retest reliability of 0.89.

The reliability of wait time measurement and classification of questions was determined by the researcher and three trained raters. The average rating and classification was used to help the researcher obtain the inter-rater reliability. According to Sanders (1966:3), Blooms (1956) classification of questions has been found to be the best known system for classifying educational objectives as well as classroom questions. It provides a useful standard for teachers to evaluate instructional materials selected for the purpose of teaching.

3.5 Procedure for Data Collection

3.5.1 Instrumentation

The researcher sought permission to use the secondary schools selected for the study from the zonal Directorate of Schools. The researcher went into the classroom to see how both teachers and students would adjust to the presence of strangers during their lessons.

Permission was also sought to tape record teachers teaching foods and nutrition lessons. The teachers were told that the tape recording of their lessons was not intended to measure competencies and that all taped lessons would be treated with strict confidentiality. This was necessary to make the teachers cooperate.

The researcher developed a table of specification (using Bloom's cognitive levels) to ensure a widespread of the test items across the existing secondary schools Food and Nutrition syllabus. This was necessary to ensure the content validity of the test items for the present study. Questions from the lower levels (knowledge, comprehension) were set as objective test items, while higher level (application analysis, analysis, synthesis, evaluation) questions were set as essay type questions. The six levels were classified into lower and higher levels for easy

analysis and interpretations of the data obtained.

3.5.2 Data Collection

In order to obtain consistency in the recordings of teachers wait time measurement, the researcher and three trained raters personally measured the wait-time I of Foods and Nutrition teachers by pressing the stop watch to start working as soon as the teacher stopped a question. The stop watch was stopped immediately a student starts to respond to the teachers question or when the teacher starts to react or rephrase the question.

Wait-time II was measured by pressing the stop watch to start working as soon as the student stopped talking, and was pressed to stop working when the teacher starts to talk again.

The second objective of the study was pursued by the researcher through a verbal transaction of the recorded Foods and Nutrition lessons. Bloom's taxonomy of educational objectives was used to classify teachers questions. The researcher categorized the first three levels of Bloom Taxonomy (knowledge, comprehension, application as the low levels, (Analysis, synthesis and evaluation) as the higher questioning levels. The researcher listened to the recorded lesson and tallied

questions appearing in the audio tape into the appropriate cognitive levels.

The third objective of the study which is the experimental study was pursued by the researcher through the recording of all the 20 teachers' wait-time measurement during the Foods and Nutrition lessons. Those teachers with optimum wait-time were classified as Group I, those that have lower than average wait times as group II and those with higher than average wait-time as group III. Only those in Group I that is those with optimum wait time of 2.7 were used as the treatment group for the study. 16 teachers were used for the experimental study. The researcher trained these teachers to use cognitive questioning levels until the group has attained an accepted level of proficiency in the use of higher questioning levels (see Training 3.5.4). The teachers were given the whole term (3 months) to teach their students. These students were initially pretested (using the test items). Similarly, the achievement test items and career aspiration scale were administered to the control group (secondary school pupils from Zaria and Soba LGAs).

The researcher administered the same test items and career aspiration scale as post-test to both the

experimental and control groups. This step is to enable the researcher assess the gain in achievement as a result of treatment. The maximum marks used for the test items was 50. This was based on WAEC conventional marking scheme of 50 as pass mark.

The pre-test and post-test were graded by the researcher and research assistants. The results of both tests formed the data that was analysed for the study.

3.5.3 Treatment

The researcher trained teachers of experimental group. These teachers were taught to increase their wait-times I and II when teaching and were also taught to raise questions at higher cognitive questioning levels in their classroom teaching. The experimental group had practice sessions until they attained an acceptable level of proficiency in the use of higher questioning levels and optimum wait-times. They were instructed to teach a class of SS III students until when most of the term syllabus has been covered. This was to allow the students to be exposed to all the syllabus so that they can be fully ready to answer the test items prepared by the researcher to test their performance. The researcher trained the teachers for

approximately four weeks after which they attained certain level of proficiency on the use of questioning levels and wait time. (See 3.5.4). The teachers were allowed to teach their students for three months after which a post test was administered to the students to test their performance in Food and Nutrition. At the end, the researcher administered the career aspiration scale as well.

The control group were not exposed to the treatment given to the experimental group. However, these teachers were allowed to teach their students who were given the same test items given to the experimental group. The result of the students performances in both cases were compared at the end of the study in order to assess the effects of the two variables, wait-time and cognitive questioning level on students performances and their career aspirations.

3.5.4 Training

A training session was taught by the researcher for four weeks (January 6th to February 6th 1998), that is during the second term of the 1997/98 academic session. The lesson was taught to all the teachers in the

experimental group at an arranged periods in all the selected schools. The researcher defined wait-times I and II to the teachers and reminded them of cognitive questioning levels. That is the lower and higher questioning levels.

The researcher selected a concept from the syllabus of the SS III class and prepared a lesson containing specified questions and wait-times. The cognitive level of questions used in the lesson were categorized using Bloom's taxonomy. The research literature on wait-time has suggested the existence of a mean wait time threshold of between 3 and 4.5 seconds. Wait-time falling outside this range are thought to have no detectable changes in the level of outcome variables. According to Toxin and Capie (1983), the inability of some wait-time studies to produce significant results may be attributable to the future of participating teachers to reach the required threshold. The researcher thus assigned 3-5 seconds threshold. When the researcher taught the lesson to the teachers, the teachers were asked to measure the wait times I and II of the researcher.

The teachers were provided practice session to familiarize themselves with increased wait time. This the

researcher did by asking the teachers themselves to audio tape their practice session and measured their relative wait-times I and II using a stop watch.

Similarly, the researcher taught the teachers how cognitive questions can be asked bearing in mind at what level they were asked. The teachers were then asked to familiarise themselves with asking high level questions so as to stimulate critical thinking in their students. Each teacher taught three lessons during the practice sessions guided by the researcher. While each lesson lasted for 30 minutes.

When the researcher has ascertained that these teachers have attained an acceptable level of proficiency in the use of higher questioning levels and optimum wait time of 3-5 seconds. These teachers were then allowed to continue their normal classes with their students for the rest of the term, after which the researcher administered the post-test using the same test items of the study.

Similarly, the researcher trained five research assistants (trained raters) on how to measure wait-times I and II and how to categorise teachers questions based on Bloom's taxonomy of questioning as described in Section 2.1 of the study. These trained raters assisted the researcher

in both the experimental and control group of the study.

3.6 Data Analysis

The data collected for the study was analysed using means, pie-chart, Pearson Product Moment Correlation, and the t-test statistics.

The means and standard deviations were used to determine the mean wait-time I and II of the teachers. Frequency tables and pie-chart were used to show the distribution patterns of teachers cognitive questioning levels. Similarly, the Pearson Product. Moment Correlation Coefficiency was employed to determine the significant relationship between the variables of the study. To test the overall occupational preference of the student across the career types the chi-square statistics was used, while the t-test was used to determine the significant difference between the Mean scores of students in the experimental and control group of the study. That is, the researcher was interested in determining whether or not one group differs significantly from another in terms of the treatment given. The null hypothesis were tested using 0.05 level of significance.

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CHAPTER 4

DATA PRESENTATION AND ANALYSIS

Introduction

This chapter contains the analysis of data collected from the study. It is presented under the following sub-headings:

4.1 The Mean Wait-time I and II of Foods and Nutrition Teachers

4.2 The Cognitive Questioning Levels of Teachers Teaching Foods and Nutrition

4.3 The Testing of the Hypotheses raised in the study

4.4 Assessment of students career aspirations in foods and Nutrition.

4.5 Discussion on the General Results and Observations Made in the Study.

4.1 The Mean Wait-Time I and II of Food and Nutrition Teachers

Wait-Time I

The mean of the three lessons for each of the sixteen teachers were calculated using computer. The mean of the means was also calculated and taken as the average wait-time of the foods and nutrition teachers, the mean scores

and standard deviation of the teachers are shown in Table 4.1 below.

Table 4.01: THE MEAN WAIT-TIME I AND STANDARD DEVIATION OF TEACHERS SELECTED IN SELECTED SCHOOLS

SCHOOLS	NO. OF TEACHERS	WAIT TIME I (MEAN) PER TEACHERS IN SECONDS	STANDARD DEVIATION
A	3	1.8	0.5
B	5	2.3	0.6
C	3	1.5	0.3
D	2	2.6	0.4
E	3	2.0	0.7
F	3	1.8	0.6
G	2	2.6	0.1
H	3	1.7	0.4
I	5	2.3	0.6
J	3	1.9	0.1

The mean of means = 2.4

Pooled Standard Deviation = 1.1

The highest mean for Wait-time I was 2.6 seconds while the standard deviation is 0.4. The table above shows that the teachers in schools D and G had the highest wait-time I

while the teachers in school C had the lowest wait time of 1.5 seconds.

Table 4.02: THE MEAN WAIT-TIME II AND STANDARD DEVIATION OF TEACHERS IN SELECTED SCHOOLS

SCHOOLS	NO. OF TEACHERS	WAIT TIME I (MEAN) PER TEACHERS IN SECONDS	STANDARD DEVIATION
A	3	1.2	0.2
B	5	1.4	0.2
C	3	0.8	0.8
D	2	1.4	0.2
E	3	1.3	0.4
F	3	1.8	0.1
G	2	1.4	0.2
H	3	0.9	0.8
I	5	1.7	0.1
J	3	1.5	0.5

The mean of means = 1.8
Standard Deviation = 1.7

Table 4.02 shows that the Mean Wait-Time II of the sampled teachers was 1.7 seconds while the standard deviation was 1.8 seconds. The highest mean for Wait-time II is 1.8 seconds with standard deviation of 0.1 seconds while the lowest mean for Wait-time II was 0.8 seconds with

the standard deviation of 0.7..

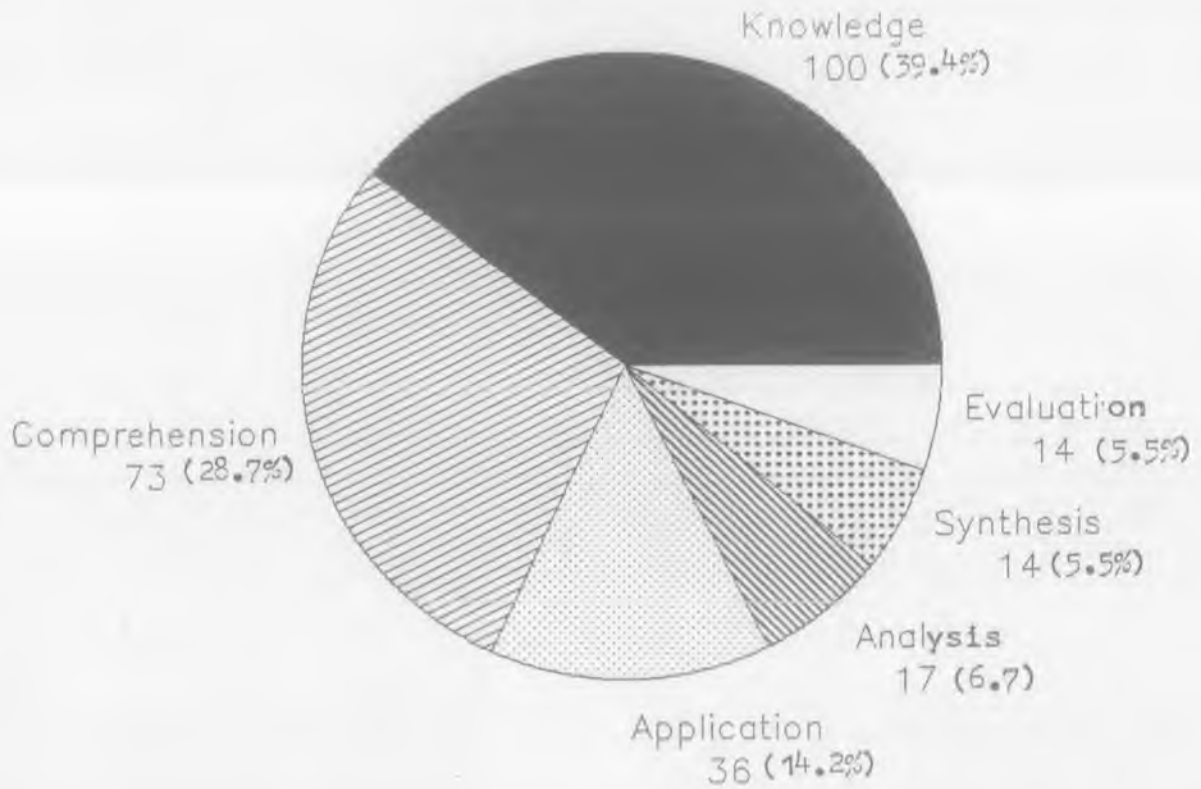
4.2 The Cognitive Questioning Level of Teachers Teaching Foods and Nutrition

During the survey part of the study a pre-test frequency distribution of teachers questions during foods and nutrition class was tape-recorded and classified based on Bloom's cognitive questioning levels. Table 4.3 shows the distribution pattern.

TABLE 4.3: DISTRIBUTION PATTERN OF TEACHER'S QUESTIONS BY LEVELS FOR ALL THE SELECTED SCHOOLS

COGNITIVE QUESTIONING LEVELS	NO. OF FREQUENCY	PERCENTAGES
Knowledge	100	39.4
Comprehension	73	28.7
Application	36	14.2
Analysis	17	6.7
Synthesis	14	5.5
Evaluation	14	5.5
TOTAL	254	100%

Chart 4.04 ~~PRE-TEST~~ Distribution of Teachers Questions by Cognitive Questioning Levels



The above distribution was presented in form of a diagram "pie-chart". (See Chart 4.04).

Table 4.03 shows a frequency distribution pattern of teachers cognitive questioning levels. At the first level, (knowledge level) a total of 100 questions were asked by the teachers. Seventy three comprehension questions, 36 application questions, 17 questions at the analysis level were asked, 14 questions at synthesis level and 14 questions at the evaluation level. The highest number of questions asked by the Foods and Nutrition teachers was at the knowledge level while the lowest number of questions asked at the synthesis and evaluation levels. Looking at the total values on the table, it could be said that generally, Foods and Nutrition teachers asked more questions at the lower cognitive levels than in the higher cognitive levels, during Food and Nutrition lessons. These frequency was further subjected to mean statistics. See Table 4.05

Table 4.05 MEAN SCORES AND STANDARD DEVIATION OF TEACHERS COGNITIVE QUESTIONING LEVELS

COGNITIVE	MEAN	SD
1. Knowledge	3.100	1.356
2. Comprehension	1.945	1.144
3. Application	.990	.827
4. Analysis	.705	.538
5. Syntheses	.555	.498
6. Evaluation	.555	.498

The above table shows the mean scores of 3.100 for the knowledge level. 1.945 for the comprehension level and .990 for the application level. These levels constitute the low cognitive levels as categorised by the researcher for the purpose of convenience during analyses. The mean scores for analyses level is .705, synthesis and evaluation had .555 as their mean scores respectively. These levels constitute the high cognitive levels. The results shows that the highest number of questions asked by the teachers were at the knowledge level while the lowest questions were asked at the synthesis and evaluation levels. However the post-test results (See Appendix VII) shows that teachers in the experimental group asked more questions at the higher

level than teachers in the control group. These results thus answered the research question two of the study.

4.3 Testing of the Hypotheses

The null hypotheses of the study were used to help the researcher answer the remaining research questions 3, 4 and 5 raised for the study.

The study has a total number of eight hypotheses meant to test the relationship among the four variables of the study, namely, Wait-time I and II, students achievement, cognitive questioning levels, and career aspirations. A test of significant difference among the two groups of the study (control and experimental group) with regards to the dependent variables of the student was conducted.

To test the relationship among the variables of the study the t-test and Pearson Product Moment Correlation Statistics were computed. Each hypothesis formulated was tested and 0.05 level of significant formed the basis for accepting or rejecting the null hypotheses for the study. The results obtained are presented as follows:

Hypothesis One

1a. There is no significant difference between the achievement of students in the control and experimental group taught with Wait-time I. To test this

hypothesis the t-test statistics was used. The result is shown on Table 4.5.

TABLE 4.06: STUDENTS ACHIEVEMENT TAUGHT WITH WAIT-TIME I

VARIABLE	N	X	SD	DF	T-VALUE	P	SIGNIFICANCE
Experiment	200	2.0470	0.041	398	-4.07	0.000	*
Control	200	1.8600	0.321				

Significant, P < 0.05

From the above table a t-value of -4.02 was found significant. Thus, there is significant difference between the achievement of students in the control and experimental group taught with Wait-time I. Therefore the null hypothesis is rejected.

Hypothesis Two

There is no significant difference between the achievement of students in the control and experimental group taught with Wait-time II.

The t-test statistics was employed to test the

hypothesis as shown in table 4.07.

TABLE 4.07: STUDENTS ACHIEVEMENT TAUGHT WITH WAIT-TIME II

VARI-ABLE	N	X	SD	DF	T-VALUE	P	SIGNI-FICANCE
Experi-ment	200	1.2115	0.392	398	-0.2202	0.000	**
Control	200	1.4300	0.439				

Significant, P < 0.05

The result obtained shown a t-value of -.2202 is found not significant. This means that there is no significant difference between the achievement of students in the Control and Experimental group taught with Wait-time II. Thus the null hypothesis is retained.

Hypothesis 3

There is no significant relationship between teachers lower cognitive questioning levels and students achievement in Foods and nutrition.

To test the above hypothesis the t-test statistics was computed. See table 4.08

TABLE 4.08; RELATIONSHIP BETWEEN TEACHERS LOW COGNITIVE QUESTIONINGLEVELS AND STUDENT ACHIEVEMENT

VARI-ABLE	N	X	SD	DF	T-VALUE	P	SIGNI-FICANCE
Teachers cogni-tive quest-ions	400	6.0650	2.338	398	-0.0402	0.000	**
Students achieve-ments	400	51.010	14.228				

From the above table the t-value of -.0402 was found not significant. Therefore, there is no significant relationship between Teachers low cognitive questioning levels and students achievements in Foods and Nutrition. The null hypothesis is thus retained.

Hypothesis 4

There is no significant relationship between teachers high cognitive questioning levels and students achievement in Foods and Nutrition. A Pearson Product moment Correlation was used to test the hypothesis. The results obtained showed a r-value of .1726 was found significant. (df = 398)., & = 0.05). Thus there is significant relationship between teachers high cognitive questioning levels and students academic achievement. The null

hypothesis was therefore rejected.

Hypothesis 5

There is no significant difference between the mean scores of students in the experimental and those in the control groups with regards to achievement in Foods and Nutrition. To test this hypothesis, also the independent variables (Wait-time and Cognitive questioning levels) were used to test for significant difference between the control and experimental group with regards to the overall performance in Foods and Nutrition. See Table 4.09 below.

Table 4.09 SUMMARY OF THE POST TEST ACHIEVEMENT RESULTS FOR THE CONTROL AND EXPERIMENTAL GROUPS

GROUPS	N	X	SD	DF	T-VALUE	P	SIGNI-FICANCE
Experi-ment	200	59.535	11.690	398	-14.96	0.000	*
Control	200	42.485	11.100				

Significant P < 0.05

To test the above hypothesis the t-test statistics was used. The result obtained showed t-value of -14.96 which was found significant. Thus, there is significant

difference between the mean score of students in the control and experimental group with regards to achievement in foods and nutrition. The null hypothesis is therefore rejected.

HYPOTHESIS 6

There is no significant difference between the mean scores of students in the experimental group and those in the control group with regards to their career aspiration. To test this hypothesis the t-test statistics was used. See Table 4.10.

TABLE 4.10: DIFFERENCE BETWEEN MEAN SCORES OF STUDENTS IN CONTROL AND EXPERIMENT GROUP AND THEIR CAREER ASPIRATIONS

VARIA-BLES	N	X	SD	DF	T-VALUE	P	REM-ARKS
Experi-ment	200	4.295	1.439	-6.54	398	.000	*
Control	200	4.295	2.239				

Significant P < 0.05

From the result above the t-value of -6.54 was found significant. Thus there is significant difference between the mean scores of students in the control and experimental group with regards to their career aspirations. The null

hypothesis is therefore rejected.

HYPOTHESIS 7

There is no significant relationship between students academic achievement in foods and nutrition and their career aspirations. This hypothesis was tested using Pearson Product Moment Correlation Statistic.

The result showed the correlation coefficient value as .3452 was significant (df - 398 P = 000). Meaning that there is significant relationship between students academic achievement and career aspirations of students. The null hypothesis is rejected.

HYPOTHESIS 8

There is no significant differences in the distribution of all the respondents across the career types. See Table 4.11 below.

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Table 4.11: COMPARISON OF OVERALL OCCUPATIONAL PREFERENCES SCORES BETWEEN CONTROL AND EXPERIMENTAL GROUP

OCCUPATIONAL PREFERENCES	CONTROL	EXPERIMENTAL	X^2	df	P.	REMARKS
No response	11	0	94.011	6	0.000	
Nutrition Teacher	19	4				
Catering	17	2				
Dietary Assistant	3	40				
Health/ Welfare	29	17				
Research	43	68				
	40	59				
Total	200	200				

* Significant P<0.05

The X^2 statistics above shows X^2 value of 94.011 at df = 6 which shows a significant difference between the groups for the overall occupational preferences of students. The null hypothesis is rejected. Thus, it can be inferred that the two category of groups view their occupational preferences differently.

4.4 Assessment of Students Career Aspiration in Foods And Nutrition

To obtain the data analysed in this section students were required to rank in order of preference the foods and nutrition related occupations they would prefer after the completion of their secondary education. For convenience and easy interpretation of the data, the ranking of the respondents were grouped according to occupational preference. For instance, in section A of Table 4.12 all those who prefer, say, nutrition teachers were grouped together to get 58 (29%) respondents, clinical nutrition 65 (32.5%), health welfare 46 (23%). Dietary Assistance and Catering Services 12 (6%) each, while only 7 (3.5%) prefer research in foods and nutrition. This analysis (See Table 4.12A below) was based on the post-test of the control group of the study.

Table 4.12A: POST-TEST RESPONSES ON RELATED FOODS AND NUTRITION OCCUPATIONS PREFERRED BY THE STUDENTS

OCCUPATIONS	A - CONTROL GROUP	%	B - EXPERIMENTAL GROUP	%
Nutritional teacher	58	29	0	0
Clinical Nutritionist	65	32.5	0	0
Dietary Assistance	12	6	49	24.5
Health/ welfare	46	23	27	13.5
Research in Foods and Nutrition	7	3.5	91	45.5
Catering services	12	6	33	10.5
TOTAL	200	100	200	100

In section B of the Table above (4.12A) 49 (24.5%) of the respondents preferred Dietary Assistance occupation, 91 (45.5%0) preferred research in foods and nutrition, 33 (16.5%) of the respondents prefer catering services, while 2 (13.5%) of them preferred health and welfare services.

Table 4.12B: PRE-TEST RESPONSES ON RELATED FOODS AND NUTRITION OCCUPATIONS PREFERRED BY THE STUDENTS

OCCUPATIONS	A - CONTROL GROUP	%	B - EXPERIMENTAL GROUP	%
No response	11	5.5	0	0
Nutrition Teacher	19	9.5	4.0	2.0
Clinical services	40	20.0	10	5.0
Catering services	17	8.5	2	1.0
Dietary assistant	3	1.5	40	20.5
Health welfare	27	13.5	17	8.5
Research	43	21.5	68	34.0
Others	40	20.5	59	29.5
TOTAL	200	100	200	100

Table 4.12B shows that during the pre-test of the study the control group 40 (20%) of the respondents preferred clinical services, 43 (21.5%) of them preferred research in Foods and Nutrition, 17 (8.5%) preferred catering services, 27 (13.5%) preferred health welfare, 19 (9.5%) of the respondents preferred nutrition teacher, only 3 (1.5%) of the respondents preferred Dietary Assistance.

While 11 (5.5%) of the respondents did not indicate their preference.

In the experimental group 17(34%) preferred research in foods and nutrition, 20% of them preferred dietary assistant 17 (8.5%) preferred health welfare services, 10 (5%) preferred clinical services while 2 (1%) and 4 (2%) preferred catering services and nutrition teacher respectively.

In the second part of the career aspiration questionnaire students reasons for choosing these occupation were sought as contained in sections A, B and C of the questionnaire (See Appendix II). This section required the students to state their reasons by ranking. For easy interpretation of the data their reasons were also grouped together to get their means. See Table 4.13

Table 4.13: THE MEAN SCORES OF STUDENTS REASONS FOR CHOOSING THEIR OCCUPATIONS

NO.	REASONS	MEANS	SD
a.	Provide good salary	1.795	0.798
b.	Provide attractive working conditions	3.435	0.669
c.	Ensures stable and secure future	3.220	0.731
d.	Give an improved social status and prestige	1.590	0.803
e.	Fondness for school subject which bear upon the profession	32.440	0.866
f.	Permit the use of my special ability or aptitude	3.165	0.775
g.	Permit me to be original and creative to work with ideas	1.950	0.714
h.	Permit me to use my hands	1.450	0.678
i.	Give me the opportunity to work with people	1.950	0.807
j.	Give me the opportunity to work with people	1.950	0.807
k.	Give me the opportunity to serve	1.480	0.665
l.	Permit me to help those less fortunate than me	3.25	0.697

From the above table, statement (e) had the highest means, meaning that the reasons for students choice of occupation was because of their fondness for school subject, with the mean score of 3.440. Statement (b) that is provide good attractive working condition has 3.435,

Statement (1) permit me to help those that are less fortunate than me 3.335. Statement (c) ensures stable and secure future with a mean of 3.220, Statement (f) permit the use of my special ability or aptitude 3.165. Statements(g and j) that is it gives me the opportunity to work with others and permit me to be original and creative 1.950 each respectively. While the lowest means went to statements a, k, h, d and c each had an average mean score of 1.590.

4.5 Discussion on the General Results and Observations Made in the Study

The study was designed to find out the effects of teachers wait-time and cognitive questioning levels on students achievement in foods and nutrition and their career aspirations. The data collected for the study are discussed in this section following the pattern outlined below.

4.5.1 The average wait-time I and II of foods and nutrition teachers.

4.5.2 Teachers cognitive questioning levels

4.5.3 The relationship between wait time and achievement

4.5.4 The relationship between teachers cognitive questioning levels and student achievement in foods

and nutrition.

4.5.5 Relationship between achievement and career aspirations of students

4.5.6 Assessment of students career aspirations in foods and nutrition.

4.5.1 The Average Wait-time I and II of Foods and Nutrition Teachers

The result obtained from the study indicated an average wait-time I for foods and nutrition as 2.6 seconds, while the wait-time II was 1.7 seconds. These results showed a great disparity from Rowe's (1974. 1986) findings of 1 second and 0.9 seconds respectively for American samples. However, when the findings for this study was compared with other findings of Nigerian teachers, it was observed that the integrated science teachers had 3.75 and 1.84 seconds for wait-time I and II respectively (Olajide, 1986, and Onyabe 1995). This result shows that integrated science teachers wait-time is longer than wait-time I and II of foods and nutrition teachers. A possible explanation to the difference may be due to the fact that teachers of integrated science are more aware of wait-time studies and its importance in the teaching/learning situation when compared with the teachers of food and nutrition. This is because in 1986, and 1995 similar studies were conducted to

measure wait-time of integrated science. Thus teachers of integrated science tend to slow down their questions during instruction to allow students enough thinking time to respond to the questions.

However, the wait-time of foods and nutrition teachers are closer to the wait-time of social sciences teachers of 2.6 and 1.3 seconds respectively (Mu'azu, 1991).

In the course of the study the researcher observed that most of the foods and nutrition teachers were not aware of wait-time variable as valuable for students in enquiry studies. Thus, teachers of foods and nutrition did not provide a long period of 'private thought' i.e. wait-time for their pupils.

The result showed that the average wait-time II of Foods and Nutrition teachers was 0.8. that of integrated science was 0.7 as reported by Olajide (1986) while Rowe (1979) in America reported 0.9 seconds. These results tend to be similar, at least all of the three results were below 1 second. A possible explanation for these findings is that, teachers during the wait-time II have been repeating or rephrasing the same questions two of three times will be glad to see a student attempting to respond to the question. As such those teachers may become impatient or

may be anxious to wait for the student to complete his/her response before they react. Thus, such teachers tend not to allow the student to finish what he/she want to say before they reframe the question or respond to students answers.

It is necessary to note that shorter wait-time II does not provide students the chance of expressing their minds as they ought to because teachers always interrupt by wanting to help students finish up their response or sometimes teachers may even disagree and cut up students response. Teachers should therefore endeavour to allow students have enough wait I and II to allow for 'private thoughts'. This would help students to develop confidence in themselves and allow for more meaningful responses. The above findings however answer the research question one raised for the study.

4.5.2 Teachers Cognitive Questioning Levels

Regarding the second research question raised for the study, the cognitive questioning levels of teachers teaching Foods and Nutrition, Tables 4.3 and 4.4 showed that more questions were asked at the knowledge, comprehension and application level (low levels) than were

asked at the analyses, synthesis and evaluation levels (high levels). These results are in line with Gyuse (1982) and Ogunniyi (1981) findings who reported that few high level questions were asked by Biology, Chemistry and Physics teachers. Similarly, the mean scores of teachers cognitive questions as shown in Table 4.4 further showed that most foods and nutrition teachers ask more questions at the lower cognitive level than at the higher cognitive level. (See Appendix VII).

Considering the curriculum of foods and nutrition (See Appendix VI of the study), most of the performance objectives for Year I and II allowed a widespread of questions at both high and low cognitive levels. However, the Year III (SS III) content of the syllabus contain more of high cognitive performance objective than low level. One would have expected the foods and nutrition teachers used for the study to set their questions towards the high level questions in line with the stated performance objective. It could be said that foods and nutrition teachers used for the study were not being faithful to the curricular dictated. the teachers did not ask their questions based on the performance objectives that were stated in unit of Year I curriculum. See sampled questions

used by teachers in Appendix V of the study. This might have contributed to why students performed averagely when faced with high cognitive questions in foods and nutrition test. (See Appendix IV). The pre-test results at the experimental group shows low scores when compared with the post-test results.

Kissock and Iyortusum (1989) view high level questions to be helpful to students in organising their thoughts and that it helps them gain insights into new problems.

Similarly Gall (1970) and Winne (1979) view high cognitive, questions as an essential ingredients of enquiry and discovery and should consequently be fostered in science education. Thus cognitive questioning are desirable in an enquiry classroom.

4.5.3 Relationship Between Wait-Time and Achievement

To test the final hypothesis of the study as indicated in Tables 4.06 and 4.07, a t-test statistics was used to find the significant difference between the achievement of students in the control and experiment group taught with wait-time I and II. The result indicated that there is gain in achievement as a result of treatment. For instance, the mean scores of the control and experiment

group was 1:8600 and 2.0470 respectively for students taught with wait-time I while students taught with wait time II had 1.4300 and 1.2115 for the control and experimental groups respectively. These findings are congruent with those reported by Tobin (1980 and 1983) who in an experimental study found that wait-time was significantly related to science achievement. The findings also agrees with Onyabe A(1995) who conducted her study using integrated science teachers in Nigeria. However, Altiere and Dwell (1991), Rowe (1986) and Tobin and Copice (1983) findings revealed that the longer the wait-time the greater the students achievement.

Longer wait-time I might have however, provided the students enough chance to comprehend and contemplate on the questions to be able to come up with meaningful answers. It might have also provided ample opportunity for more students to answer questions. Thus a threshold of 3-5 seconds wait time I as used for this study seems to provide students more time to think over the answers properly before responding. It was also observed during the courses of the study that teachers in the control group who used short wait-time did not give time for students to think or exchange ideas freely as such students were always quiet in

the class. In addition, where such category of students (control group) were given the time to answer questions, the students did not respond well to the questions asked. A possible explanation for this is that the teachers in the control group were mostly interested in pouring out facts to the students. And may all the time be either rephrasing, repeating or answering the questions, ignoring students participation in the class.

Thus, from the on-going discussions it could be said that there is gain in achievement as a result of extending wait-time I and II, and longer wait-time are necessary for thinking over possible answers to questions and even for sharing ideas among students which at the long run would improve students achievement in foods and nutrition. The findings therefore answered the third research question raised for the study. Meaning that teachers wait-time relates to students academic achievements.

4.5.4 Relationship Between Teachers Cognitive Questioning and Students Achievement in Foods and Nutrition

Regarding the fourth research question raised for the study, relationship between teachers cognitive questioning levels and students achievement in Foods and Nutrition. The researcher decided to group the first three levels of cognitive domain i.e. knowledge, comprehension and application as the lower cognitive questioning levels, while analysis, synthesis and evaluation as the higher cognitive questioning levels. Table 4.7 a t-value of -.0402 which was not significant meaning that the teachers lower cognitive questioning does not relate to students performance in foods and nutrition. This findings are in line with Riley (1986) findings who in an experimental study discovered that learners derived more benefits from the combination of all the cognitive questioning level than from exclusive use of either one of them. One possible explanation to why students do not derive much benefit from low cognitive questioning is that cognitive questions do not lead and probe students into critical thinking even where the teachers teach in an enquiry classroom. This implies that the use of mainly factual questions in instruction by food and nutrition teachers tend to prevent

students from developing high level of cognitive ability.

It is also possible that foods and nutrition teachers in the control group fear that the students they were teaching would not be able to answer correctly when faced with high cognitive questions. And since these teachers wanted to impress the researcher that, their lessons were understood by their students, they tend to ask low cognitive questions in their bid to evaluate their lessons.

Regarding the relationship between teachers higher cognitive questioning levels and students achievement in foods and nutrition. Table 4.8 showed that the r-value of .1726 was not significant. This revealed that teachers high cognitive questioning level is related to students high achievement in foods and nutrition. This findings are in line with Tobin (1983) report who in an experimental study found that questioning wait-time was significantly related to science achievement. However, in another study conducted by Sadker in Copper (1977a) reported that in classes where high order thought-provoking questions were asked students perform better in achievement test.

A possible explanation for this is that high order question makes students to think rather than memorise facts, as such students engage in critical thinking when

faced with a problem. This explains why students who engage their minds in critical thinking during foods and nutrition are in a better position to defend their findings in an enquiry class. This implies that such category of students would perform better in problem solving situation than a student faced with lower cognitive questioning levels. (See Appendix 4). Students perform better in the post-test than in the pre-test. This is as a result of the treatment given to the teachers in the experimental group whereby longer wait-time with high cognitive questioning were used in teaching students.

Similarly, some researchers such as Altiere and Dwell (1991) and Tobin (1984) found that extending wait-time after higher cognitive questioning levels usually improve performances of students in higher cognitive level test questions. However, Riley (1986) reported that the cognitive demand made on students responding to low level questions does not require extended time for processing. Teachers who extend the wait-time of knowledge level questions beyond three seconds should not expect corresponding improvement in students achievement. This implies that teachers should wait longer than 3-5 seconds after asking high cognitive questions, this according to

Tobin and Dwell could enable the pupils to improve the quality and quantity of their responses thereby increase their performance. This implies that the general performances of students in the SSCE Foods and Nutrition Examination as shown in Table 1.1 of this study could be improved upon if teachers engaged the minds of their students with high order questions with enough thinking time. This method of asking questions if properly done could with time (2 years) improve students performance not only in class test or examination but it will also improve the SSCE results of Foods and Nutrition in future.

The study further tested the overall performance of the control and experimental groups with regards to both wait-time and higher cognitive questioning levels. Table 4.9 of the study indicated a significant difference exist between the mean score of students in the control and experimental group with regards to achievement in foods and nutrition. This implies that the treatment given to the experimental group which is a combination of extended wait-time and higher cognitive questioning levels has made the students in the experimental group to perform better than those in the control group. Thus a combination of extended wait time and use of higher cognitive questioning levels as

discussed early is necessary in an enquiry classroom, since this would improve student performances. The findings above thus answered the fourth research question raised in the study.

4.5.5 Relationship Between Achievement and Career Aspirations of Students

Regarding the fifth research question raised for the study, i.e. relationship between students achievement and their career aspirations. The result in Table 4.10 indicated a t-value of -6.54 which was significant. Meaning that there is a significant difference between the mean scores of students in the control group and those in the experimental group, with regards to their career aspiration. The implication of this findings is that students who are taught food and nutrition with extended wait-time and higher cognitive question levels would have a different career aspirations than those students who are not exposed to the same treatment.

One possible explanation for this findings is that nearly all occupations involve some problem solving and some thinking. If for instance, the foods and nutrition teacher teaches students by combining the application, analyses and evaluation of cognitive questioning levels such students might display their talents towards skills

development and use their critical thinking abilities. Such category of students would be in a better position to express their career aspirations. This findings is congruent with Supers (1957) theory of vocational development which states that the development of occupational preferences can be guided and that individual's ability and exposure would form the basis for decision making in choosing an occupation. Similarly Ginzberg's (1951) theory viewed students career development as a learning process which could be facilitated by involving students into various learning situation which have occupational implications. In another study Salton (1980) reported that students believe that their works as human beings depend on the amount of ability they possess and that their performance on achievement task will demonstrate their level of ability. Thus, it is necessary that, teachers help students during the teaching/learning situation to build up their inherited talents, through setting enquiry questions with all the skill necessary so as to make students cope with the transition from studies to work place. Thus this result answered the fifth research question raised for the study.

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4.5.6 Assessment of Students Career Aspirations in Foods and Nutrition

In response to the second item of the career aspiration questionnaire (see Appendix II) students were asked to rank in order of preference the Food and Nutrition related occupation they would prefer after their secondary education. The students responses in the pre-test of the study showed a summary of the ranking in this order:

1st choice - Clinical Nutritionist

2nd choice - Nutrition teacher

3rd choice - Health/Welfare

4th choice - Dietary Assistance

5th choice - Catering Services

6th choice - Research in Foods and Nutrition

This result showed that students choose their careers without due consideration of their ability in the area of choice. One possible explanation for this findings is that students do not know what implication their choices has with their performance. To some of them, they simply choose the career because their parents wanted them to (parents pressure) or because their parents do it and earned their living through those occupations. While some simply choose these occupations because their classmates

(peer pressure) chose them. Other factors such as economic pressure could also affect students choice of career.

However, after the treatment was given to the experimental group, the post-test result in table 4.12A showed that students from the experimental group ranked their occupational preference in this order:

1st - Research in Foods and Nutrition

2nd - Dietary Assistant

3rd - Catering Services

4th - Health/Welfare

The results showed that there is a significant difference between the occupational preference of students in the sub-groups of the study (control-experimental group). From the findings, one would observe that due to the treatment given to the experimental group most of the respondents are more inclined to services career (e.g. catering services, dietary, research etc.) and do not seem to be interested in teaching profession. A possible explanation for this finding is that most students who are skill oriented do not like the teaching profession particularly when teaching is no longer attractive to the younger generations. Many believe that teaching does not

attract the younger generation because of its non-attractive conditions of services. Others simply say teaching requires more vigorous academic demand yet does not pay well at the long run. As such these students prefer occupations that will pay them well, that is the skill oriented occupations.

To further test the findings on all the occupations students preferred, the chi-square test table 4.11 showed that the control group view their occupational preferences differently from the experimental group. This implies that students who are taught with extended wait-time and higher cognitive questioning levels will perform better in achievement test and would thus tend to choose a better career in foods and nutrition.

However, when students were further asked their reasons for choosing their occupations (See Appendix II sections A,B,C,) most students said that it was due to the attractive working conditions and their fondness for the school subject which bear upon the profession. A possible explanation for this findings is that when teachers of foods and nutrition have developed in the minds of the students critical thinking and exposed them to all the necessary enquiry approach to problem solving, the students

could now see the relationship between studies in foods and nutrition and their occupational implications. This could even increase students interest in food and nutrition, thus they would be fond of the subject.

The second reason for students choice of occupation is because such occupations permits them to help the less fortunate people. This explains why students prefer the services occupations such as Dietary assistance, catering services, health and welfare services.

Another reason why students choose their occupation is that, it permits the use of their special ability and aptitude and that it also ensures stable and secure future for them. This findings may be connected to the various kinds of exposure students receive from their teachers which tend to boast students inherited talents, which would definitely help them in deciding the nature of work that will match their ability. Thus it could be concluded that students ability is a determinant of their career aspirations.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Study

The study was undertaken to find out the effect of teachers wait-time and cognitive questioning levels on students achievements in Foods and Nutrition. The study found out the relationship between students achievement and their career aspirations. Earlier research work conducted in this area include wait-time studies such as wait-time and socio-cultural factors in an integrated science classroom (Olajide 1986), Onyabe (1995) worked on the relationship between wait-time and students verbal behaviour in integrated science classroom while Mu'azu (1991) worked on wait-time of social science teachers, all these studies were conducted in Nigeria. Similarly, studies conducted outside the country on wait-time and cognitive questioning level include Tobin (1980) and Rowe (1987) who worked on extended wait-time and science achievement. Riley (1986) worked on effects of wait time and science achievement. Riley (1986) worked on effects of wait time and cognitive questioning (knowledge and combination_) levels on students achievement while Moriber (1971) and Deture (1976) also worked on wait-time studies.

This present study established the fact that teachers wait time and cognitive questioning levels not only relates to students achievement but it also relates to students career aspirations.

The following hypotheses were tested in an attempt to answer some of the questions raised in the study.

Hypothesis 1

There is no significant difference between the achievement of students in the control and experimental group taught with wait-time I.

Hypothesis 2

There is no significant difference between the achievement of students in the control and experimental group taught with wait-time II.

Hypothesis 3

There is no significant relationship between teachers low cognitive questioning level and students achievement in foods and nutrition.

Hypothesis 4

There is no significant relationship between teachers high cognitive questioning levels and students achievement in foods and nutrition.

Hypothesis 5

There is no significant difference between the mean scores of students in the experimental and those in the control groups with regards to achievement in foods and nutrition.

Hypothesis 6

There is no significant difference between the mean scores of students in the experimental group and those in the control group with regards to their career aspiration.

Hypothesis 7

There is no significant relationship between students academic achievement in foods and nutrition and their career aspirations.

Hypothesis 8

There is no significant differences in the distribution of all the respondents across the career types.

The following instruments were used for the study. A stop-watch to measure teachers wait-time I and II. A tape-recorder to record teachers cognitive questioning levels based on Blooms' classification. Mohammed's Foods and Nutrition Achievement Test Instrument (MFATI) to measure students' achievement and a Career Aspiration Scale (an

adaptation of Bakare's MOPS, 1977) scale, to measure students career aspirations.

On the whole 10 secondary schools from Kaduna State were used for the study. Five schools in Kaduna North for the experimental study and 5 schools from Zaria and Soba Local Government Areas for the control group. Sixteen teachers were used for the study. Lessons on Foods and Nutrition were recorded to measure teachers wait-time and questioning levels from the play back of the cassettes. The Achievement Test Instrument and the Career Aspiration Scale were administered as pre-test and post-test of the study. The data collected from the pre and post-test form the basis for analysing the data for the study.

The analysis included the calculation of the average wait-time I and II of the sampled teachers. Frequencies of responses on teacher's cognitive questioning levels were used and analysed using percentage and pie-chart. Furthermore, the mean, t-test, chi-square and correlation coefficient statistics were used to reject or retain the hypothesis of the study. 0.05 level of significant was used for the null hypothesis of the study.

5.2 Summary of Research Findings

1. The wait-time I and II of Foods and Nutrition teachers

was 2.6 seconds and 1.7 seconds respectively.

2. Foods and Nutrition teachers ask more questions from the low cognitive questioning i.e. (low level 209 and 32 high cognitive questions).
3. There was significant difference between the achievement of students in the control and experimental group taught with wait-time I. The result showed a t-value of -4.02 which was found significant. Meaning the experimental treatment given to the teachers relates to students achievement P< 0.5 - 0.05. The null hypothesis was rejected.
4. There was no significant difference between the achievement of students in the control and experimental groups taught with wait-time II. The result indicated a t-value of -.2202 was not significant, meaning the experimental treatment given to teachers of Foods and Nutrition does not relate to students achievement. P,0.05 P - 0.05. Thus the null hypothesis was retained.
5. There was no significant relationship between teachers low cognitive questioning levels and students achievement. The result showed that teachers low cognitive questioning is not related to students

achievement i.e. t-value of -.0402 was not significant. (P>0.05 P - 0.05). Thus the null hypothesis was retained.

6. There was significant relationship between teachers high cognitive questioning levels and students achievement in Foods and Nutrition. The result showed that teachers high cognitive questioning relates to students achievement. The r-value of.1726 was found significant. P< 0.05 P - 0.05. Thus the null hypothesis was therefore rejected.

7. There was significant difference between the mean scores of students in the experimental group and those in the control groups with regards to achievement in Foods and Nutrition. The result indicated that students overall scores in the experimental group is different from the overall scores of students in the control group. The t-value of -14.96 was found significant. (P<0.05 P - 0.05). Thus the null hypothesis was rejected.

8. There was significant difference between the mean scores of students in the experimental group and those in the control group with regards to their career aspiration. The results showed that students scores in both groups are not the same with regards to their career

aspiration. The t-value -6.54 was found not significant. P<0.05. Thus the null hypothesis was rejected.

9. There was significant difference between the groups (control and experimental) for the overall occupational preferences of students. The result showed that the groups view their occupational preferences differently. The X^2 value of 94.011 at df = 6 was found significant. P< 0.05 P - 0.05. Thus the null hypothesis was rejected.
10. There was significant relationship between achievement and career aspiration of the students. The result showed that students achievement in Foods and Nutrition relates to their career aspirations. The r-.3458 was found significant P < 0.05 P - 0.05. Thus the null hypothesis was rejected.

The findings of the study also revealed that majority of the students aspire to take service career such as Dietary Assistance, Catering Services, Health/Welfare Services and Research in Foods and Nutrition. The study also discovered that students reasons for their choice of career was due to amongst other reasons, the attractive working condition of such occupations, their fondness for

the school subject and because these occupations permit the use of their special abilities or aptitude.

5.3 Implication of the Findings

Foods and Nutrition at the secondary school is an enquiry based subject and for an enquiry oriented subject to be successful the students need time for 'private thought' i.e. wait-time. The results of this study have shown that extending teachers wait-time improved the performance of student. In addition, the study found that using extended wait time alongside with higher cognitive questioning improves the academic performance of students. It might be necessary that Nigerians foods and Nutrition teachers learn and practice the use of wait-time questioning so as to make their instruction effective. The study also revealed that, students achievement in Foods and Nutrition relates to career aspirations of students. This implies that the higher the academic performance of students the better for them when faced with a choice of career. Thus, it is necessary that teachers adopt teaching students the skills of problem solving rather than factual presentations in all the content area of foods and nutrition. This will infuse into the minds of the students the various skills learnt in the classroom and their

occupational implications.

Finally, in Nigeria little published work has been done in this area of study. It is therefore necessary to emphasise the use of teachers wait-time and cognitive questioning to improve students achievement and their career aspirations in other enquiry oriented subjects.

5.4 Conclusion

Based on the findings and within the constraints of the study the following conclusions may be drawn:

1. Wait-time I and II of Foods and Nutrition teachers was 2.6 seconds and 1.7 seconds respectively.
2. Teachers of Foods and Nutrition asked more low cognitive questions than high cognitive questions.
3. The achievement of students in the control group differ from the achievement of students in the experimental group with regards to teachers wait-time I) $t = -4.02p < 0.05$ P - 0.05).
4. The achievement of students in the control group differ from the achievement of students in the experimental group with regards to teachers wait-time II ($t = -.2202$ $P < 0.05$ P - 0.05).

5. ?Teachers lower cognitive questioning levels does not relate to students achievement (t = -.0402 P > 0.05 P- 0.05).

6. Teachers high cognitive questioning levels relates to students achievement in Foods and Nutrition r = .1726 P < 0.05 P - 0.05.

7. The mean scores of students taught with both extended wait-time and high cognitive questioning levels differ from the mean scores of the control group who were not given any treatment (t = -14.96 P < 0.05 P - 0.05).

8. The mean scores of students in the control group differ from the mean scores of students in the experimental group with regards to their career aspirations (t = -6.54 P < 0.05 P 0.05).

9. The two category of groups (control and experimental) view their occupational preferences differently (X^2 - 94.011 and df= 6, P < 0.05).

10. Students achievement in Foods and Nutrition relates to their career aspirations (r = 0.3458 P < 0.05 P - 0.05).

11. Food and Nutrition students preferred services occupations such as Dietary Assistant, Health Welfare Services, Catering Services and research in foods and

nutrition.

12. Foods and nutrition students agreed that their reasons for their choice of occupation are the attractiveness of the working condition of such occupations, their fondness for the school subject and because these occupations permit the use of their special abilities or aptitude.

5.5 Limitation of the Study

One of the limitations of the study was that some of the students were not willing to answer questions in the classroom because they could not communicate effectively in English, nor could they express themselves when faced with the high cognitive questions stated on the test-items administered. The researcher handled this problem by randomly calling students to answer questions asked by the teacher. The researcher also had to listen to some of these students response verbally (that is the way they state them) and such responses were interpreted on the test-item by the researcher so as to avoid unanswered questions.

Another limitation of the study is the problem of the subjects of the study being equally matched i.e. (experiment and control group). This problem was handled

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by the researcher's random assignment of the groups into the experimental group and control group. This measure is viewed by Hepner and associate (1992) as a means of controlling extrenous variables that can't be controlled by the researcher.

The results of the study should therefore be viewed in the light of these constraints.

5.6 Recommendations

Based on the findings of the study the following recommendations are made:

1. Teachers of Foods and Nutrition should know that it is an enquiry subject. And for a successful teaching of the subject, teachers should lead students into problems solving by asking high cognitive questions, conducting experiments to test hypothesis and drawing conclusions based on their findings. The researcher suggests that the teachers role is to guide and direct students during the teaching/learning process in an enquiry oriented classroom.
2. Seminars and Workshops on the use of extended wait-time and high cognitive questioning should be organised for secondary school teachers and teachers of tertiary institutions. This will help practicing

teachers to see the importance of wait-time and higher cognitive question in an enquiry classroom. The researcher recommends the use of wait-time threshold of 3-4 seconds so as to provide students with enough thinking time for meaningful responses.

3. Since the use of extended wait-time and high cognitive questioning have been found to improve the performance of students, which at the long run improves students desire for a career in Foods and Nutrition, it then becomes necessary that, Foods and Nutrition teachers should ensure that the facilities necessary for skill development are made available by the school. This will prepare students to see the relationship between their studies and their work implications.

4. The curriculum planners should review the contents of foods and nutrition to ensure better skill training. This step will help students and even teachers appreciate the career prospects students are likely to go into as they enter the world of work.

5.7 Recommendations for Future Research

1. A similar research in other areas of Home Economics such as Home Management, Child Development, Clothing and Textiles, etc., should be conducted.

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APPENDIX I

Achievement test items.
(By Aisha.Z.Muhammad)

Instructions _ Answer all questions in part A & B.

Part A Answer ' True' and 'False' for each statement

(1) Food and Nutrition is concerned with the choice preparation and serving of the foods we eat and what it does to the body.

(2) The areas of studies in nutrition include Teaching, Food Technology, Food Service and management, Food Research and community Nutrition.

(3) The body-building nutrients are called vitamins.

(4) The food source for protein include, soya beans groundnuts, and crayfish.

(5) Iodine test is used for test the presence of protein in food.

(6) The effect of heat on carbohydrates reduces the nutritive content of the food.

(7) A toddler requires a lot of proteinious food and protective food normal growth rate.

(8) The pregnant and lactating mothers need plenty of carbohydrate foods and loss of protein.

Instruction.:- Each question is followed by five options A and E. Find the correct option for each question and shock. Give only one answer to each question.

(1) Which of the following careers may not be foods and nutrition based:

(a) Teaching.

b) Dietetics.

(c) Food technology.

(d) Interior decoration.

(e) Home making.

(2) The function of protein include all the following except:

(a) Repairs of worn out tissue.

(b) Provide energy for work.

(c) Body-building.

(d) Growth.

(e) Healthy appearance.

(3) The common nutrient obtained from palm oil, carrots and papaws is:

(a) Protein.

(b) Vitamin B.

(c) Vitamin A.

(d) Carbohydrate.

(e) Vitamin C.

(4) The common units of measurement use in the food laboratory include:

(a) Kilogram.

(b) Milligram.

(c) Centigrams.

(d) Litres.

(e) all of the above.

(5) The importance of weights and measures to the consumer is to:

I Know the weight of the food items.

II Determine which product gives you the best.

III For your money.

(a) I and II only.

(b) II and III only.

(c) III and only.

(d) I,II and III.

(e) I and III only.

(6) One of the factors governing meal planning is:

(a) The weather.

(b) The nutrition needs of the persons to be served.

(c) The food gadgets available.

(d) Availability of electricity.

(e) None of the above.

(7) (a) Which of the following dishes is most suitable for anaemic patient?

(a) Bean balls.

(b) Corned beef stew.

(c) Cocoa bread.

(d) Spinach stew.

(e) Liver soup.

Instruction.:- Fill in the gaps.

#(1) The relationship between Nutrition and Home Economics is:

Nutrition is - - - - - - - - - - - - - -

while Home Economics is - - - - - - - -

#(2) The food nutrients found in a bowl of garri taken with groundnuts are:_____

_____

_____

#(3) The simple physical test for carbohydrates is:

_____

#(4) When planning a balanced meal for a 70 years old man we need to include:_____

*(1) Distinguish between:

(a) Digestion.

(b) Metabolism.

*(2) What food nutrients should be considered a balanced meal for an adult: _____

_____

_____

*(3) What is the approximate equivalent of 103 in grams:_____

*(4) Differentiate between a diet of :

(a) An overweight.

(b) An underweight.

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**(5) Explain two roles of a clinical Nutritionist

(a)_____

(b)_____

**(6) How can we enrich a bowl of millet pap for a 9 months baby:

(a) _____

(b) _____

(c) _____

**(7) Propose three simple standard food measurement equipment and their functions in the laboratory:

(a)_____

(b) _____

(c)_____

**(8) Plan simple (2 course) balanced meal for the family.

_____

_____

***(9) What are the main two nutrients in ground melon (egusi)

(a)_____

(b)_____

**(10) How does heat and Iodine affects carbohydrates?

(a)_____

(b)_____

***(11) Compare and contrast the diet of invalid and underweight person, both for a low income family set up.

Invalid	Underweight
(a)_____	(a)_____
(b)_____	(b)_____
(c)_____	(c)_____
(d)_____	(d)_____

KEY: -> Knowledge (1-8)

- Comprehension (1-7)

Application (1,2,3,4)

* Analysis (1,2,3,4)

** Synthesis (5,6,7,8)

*** Evaluation (9,10,11)

APPENDIX II

CAREER ASPIRATIONS QUESTIONNAIRE

Name _____ Father's Occupation.

Age _____ Mother's Occupation.

OCCUPATIONAL PREFERENCE.

1.Which occupation or profession would you like to engage in when you complete your education.

a. Medical Doctor

b. Veteranian.

c. Nutritionist.

d. Teacher.

e. Nursing/Midwife.

f. Business/Trader.

g. Lawyer.

h. Engineer.

i. Farmer.

j. Journalist.

h. Others _____

Please Specify.

2. Which of these nutrition related occupation would you prefer? (Rank in order preference)

a. Nutrition Teacher.

b. Dietary assistance.

c. Catering services.

d. Clinical Nutritionist.

e. Extension Worker.

f. Health/Welfare

g. Research.

h. Others _____

Please specify

Reasons for Choosing Your Occupation.

There are some reasons why you like the type of work you would like to do on leaving the school, as indicated in question 2 above. Select the most appropriate reasons for your choice by ranking the best reason with 1, second reason 2 etc. for sections A - C.

Section A.

a. Provide good salary.

b. Provide attractive working conditions.

c. Ensure stable and secure future.

d. Give on improved social status and prestige.

Section B.

e. Fondness for school subject which bear upon the profession [ ]

f. Permit the use of my special ability or aptitude. [ ]

g. Permit me to be original and creative to work with ideas.[ ].

h. Permit me to use my hands.[ ].

Section C.

i. Give me a chance to exercise leadership. [ ].

j. Give me the opportunity to work with people. [ ].

k. Give me the opportunity to serve. [ ].

l. Permit me to help those less fortunate than me. [ ].

APPENDIX III

TABLE OF SPECIFICATION

TEST ITEMS ON FOODS AND NUTRITION

CONTENT	KNOW-LEDGE	COMPRE-HENSION	APPLI-CATION	ANALYSIS	SYNTHESIS	EVALU-ATION	% TIME
Introduction to foods and nutrition careers	2	1	1	1	1	1	6
Basic food nutrients	2	2	1	1	1	1	8
Scientific methods in food and nutrition	2	2	1	1	1	1	8
Special nutritional needs	2	2	1	1	1	1	8
TOTAL	8	7	4	4	4	3	30

*NOTE: Thirty questions were set as test items of the study

APPENDIX IV

PRE AND POST TEST SCORES ON ACHIEVEMENT

EXPERIMENTAL GROUP

PRE-TEST						POST TEST				
A	B	C	D	E		A	B	C	D	E
54	35	36	26	26		72	61	37	42	40
55	42	40	24	22		50	92	50	41	50
34	40	39	57	20		54	71	36	20	50
30	46	46	29	40		50	54	59	62	60
50	60	50	34	42		77	56	53	57	56
33	61	59	32	50		52	44	31	36	58
56	37	40	37	46		80	70	58	59	80
35	36	26	49	58		50	66	46	57	82
22	35	24	34	22		64	68	44	57	44
41	42	57	38	26		70	64	55	37	36
39	40	69	29	24		31	77	60	55	38
16	46	41	24	30		30	66	62	61	40
16	60	43	36	38		60	62	58	64	54
20	61	36	38	60		70	61	56	58	58
22	37	32	40	44		64	50	50	68	38
26	34	40	50	40		50	48	72	80	56
50	32	38	44	20		53	47	78	64	50
44	32	38	42	22		58	80	76	70	39
41	40	40	40	26		70	71	72	65	71
24	36	44	40	22		75	58	66	60	75
20	26	42	34	26		77	62	56	62	65

30	24	36	36	28		55	60	50	61	62
34	18	34	34	40		60	52	50	70	60
38	22	38	46	42		73	54	56	50	52
40	20	22	42	38		72	52	58	50	54
22	41	20	42	24		65	50	64	45	53
20	46	18	46	26		68	60	62	48	60
20	46	18	46	26		68	60	62	48	60
28	64	42	28	58		58	70	54	67	70
32	58	44	32	50		49	65	59	68	58
26	56	44	24	43		50	60	60	61	82
26	46	50	26	42		55	55	62	60	83
34	40	56	36	20		70	65	60	50	70
34	40	42	60	62		22	65	70	63	71
24	42	36	49	46		54	80	70	78	56
54	34	24		50		72	66	77		50
56	40	26		42		72	66	77		50
56	40	26		42		76	70	60		56
24	46	40		44		50	64	70		54
20	50	59		25		52	66	66		60
24	40	50		46		50	60	80		62
		46						65		
		38						60		
		36 38 62						62 50 59		

KEY:

A = Kawo, B = Doka, C = Gwarzo, D = Tafawa Balewa, E = Independence

CONTROL GROUP

PRE-TEST						POST TEST				
A	B	C	D	E		A	B	C	D	E
60	50	28	32	60		40	50	40	51	55
40	52	29	39	50		51	51	40	31	60
50	40	50	40	40		57	54	38	25	50
32	30	39	40	42		40	57	38	17	40
38	31	38	40	53		45	30	37	18	43
42	40	39	42	45		39	32	40	16	45
48	53	40	41	48		37	32	37	18	50
38	56	41	44	38		40	38	46	37	48
38	45	50	44	39		28	45	46	24	39
36	48	44	38	40		30	52	49	10	40
40	49	60	37	49		27	51	49	14	49
48	49	43	36	50		40	50	48	22	50
42	50	42	39	52		45	57	48	34	51
50	55	40	44	28		40	40	40	26	35
32	32	41	41	28		47	50	40	20	38
38	39	42	42	39		51	50	50	12	39
36	40	42	48	40		58	40	51	18	40
50	39	50	49	41		56	41	52	32	41
45	51	55	50	45		40	43	53	16	45
49	52	51	51	50		42	42	54	20	50
47	51	52	51	53		40	42	50	18	52
50	50	53	53	52		32	41	49	13	45

39	40	60	54	49		31	45	47	12	49
38	28	67	55	45		39	46	42	18	40
38	28	65	30	40		45	47	45	23	39
36	36	67	32	33		28	47	46	28	33
39	30	63	38	39		39	50	48	24	50
55	32	40	32	50		45	35	49	32	45
52	33	40	30	51		50	60	38	53	43
58	39	30	40	45		60	55	40	54	51
48	40	32	41	43		55	56	41	51	39
40	45	33	47	50		58	50	50	56	40
42	50	35	38	38		44	40	48	49	48
41	51	32	35	40		52	49	50	50	42
50	40	38	40	50		44	46	44	49	40
51	38	37	44	40		68	36	47	50	40
43	37	33	41	32		55	37	47	55	51
49	32	35	42	38		55	40	50	52	40
40	30	37	43	39		60	41	57	53	42

KEY: A = Samaru
B = Soba
C = Chindit
D = Kafanchan I
E = Kafanchan II

APPENDIX V

SAMPLED QUESTIONS USED BY THE TEACHERS DURING THE PRETEST OF THE STUDY

TOPIC	PERFORMANCE OBJECTIVES	TEACHERS QUESTIONS
Special Nutritional Needs	1. Discuss the nutritional requirements of different age groups. 2. State the factors governing meal planning 3. Plan meals to meet individual nutrient requirement	1. What is the nutritional requirement of infants 1 year-2 years old? 2. What is meal planning? 3. State any factor that governs meal planning? 4. Identify one meal that can be prepared for an old aged man?
Egg cookery.	1. Identify different types of eggs. 2. Discuss the nutritive value of eggs. 3. Test for and choose fresh eggs. 4. Prepare, cook and serve eggs for a meal	1. Name any type of egg you know? 2. Mention one nutritive value of egg? 3. Who can tell me how to choose fresh eggs? 4. Mention one method of preparing egg? 5. State one method of serving eggs for a meal?
Legumes and Vegetables	1. State the value of different classes of vegetables. 2. Choose good quality vegetables and legumes during purchases.	1. Name one vegetable you use in cooking? Mention the nutritive value obtained from the vegetable? 3. What does this nutrient

	3. Apply appropriate preparatory measures to vegetables. 4. Select appropriate methods of cooking that will ensure minimum loss of nutrients.	supply to the body? 4. Explain to the class how you should choose vegetables? 5. Mention one appropriate methods of cooking that will minimise loss of nutrients? 6. Mention two factors to be considered when purchasing legumes and vegetables?
Fruits	1. Differentiate between fruits and vegetables. 2. Choose and purchase fresh fruits. 3. Prepare, cook and serve fruits. 4. Identify the seasons when some common fruits are abundant.	1. State the differences between fruits and vegetables? 2. Mention three ways we can purchase fresh fruits? 3. How can we prepare and cook fresh fruits? 4. How can we serve fruits to our visitors?
Beverages	1. Prepare light beverages. 2. Select and prepare juices and drinks for different occasions	1. What is beverage? 2. Mention all the beverages you know? 3. State the method of preparing one of the beverages mentioned in class? 4. How can we prepare orange drink? 5. What ways can fruit juice be served?

Rechauffe (left over cookery)	1. Explain what is meant by Rechauffe. 2. Describe thrifty ways to make use of left over foods	1. What is Rechauffe? 2. What ways can we cook left over food? 3. Mention three foods you know that you can recook of left over food?

APPENDIX VI

NATIONAL CURRICULUM FOR SENIOR SECONDARY SCHOOLS

(Foods and Nutrition)

DISTRIBUTION OF CONTENT INTO YEARS

KASHIM IBRAHIM LIBRARY

MAJOR TOPICS IN YEAR 1

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2. Basic Food Nutrients
3. Scientific Methods in Foods and Nutrition
4. Special Nutritional Needs

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3. Hygiene

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1.2 Poultry
1.2.1 Eggs
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1.4 Fish and shellfish
1.5 Other main foods
1.5.1 Legumes and Vegetables
1.5.2 Cereals and Grains
1.5.3 Fruits
2. Condiments and seasonings.

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1. Beverages
2. Rechauffe (Leftover Cookery)
3. Cookery Assignments

YEAR 1

UNIT 1: NUTRITION AND HEALTH

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEAC
1. Introduction To Foods And Nutrition Careers.	Students should be able to: 1. define Nutrition; 2. describe the areas of studies in nutrition; 3. identify various job opportunities that exist for a Nutritionist; 4. explain the relationship between Nutrition and Home Economics; 5. describe the inter-disciplinary nature of Nutrition Study.	Areas of Study in Foods and Nutrition: – Teaching – Dietetics – Food Experimentation – Clinical Nutrition – Food Science – Food technology – Food Engineering – Food Service and Management – Food Research and development. – Community Nutrition.	– Find out the requirements for further education in Foods and Nutrition in: (a) the Colleges of Education, (b) the Universities, (c) Colleges of Technology (d) Colleges of Agriculture – Write an application for employment as: (a) Dietary assistant (b) Nutritionist (c) Catering trainee. – Invite experts to give career talks. – Visit: (a) Hospital dietary unit (b) Food Industry.	Stress the key areas are requisite for each The interdisciplinary n of nutrition must be plained to the stud show how biology, ch try, agriculture and subjects are related t study of foods and tion.
2. Basic Food Nutrients	1. list the various food nutrients and their contribution to health and appearance; 2. identify food sources of nutrients;	A. Carbohydrates – (i) functions (ii) food sources (iii) digestion and metabolism (iv) dietary deficiences.	– Classify the variety of local foods available according to the nutrients they chiefly supply. – Consult a food composition table and compare your classification with the nutrient composition in the table.	Explain common nu terms such as: nutrition, malnut undernutrition, star kwashiokor, marasmu rients, metabolism, lism, catabolism an dation.

NUTRITION AND HEALTH (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
Basic Food Nutrients *(continued)*	3. describe the digestive processes of each nutrient; 4. define simple metabolic terms; 5. discuss symptoms and causes of dietary deficiency diseases; 6. use food tables to determine the nutrient composition of food items.	B. Proteins – (i) functions (ii) food sources (iii) digestion and metabolism (iv) dietary deficiencies. C. Fats – (i) functions (ii) food sources (iii) digestion and metabolism (iv) dietary deficiencies. D. Vitamins – (i) Fat-soluble functions food sources dietary deficiencies (ii) Water soluble functions food sources dietary deficiencies. E. Minerals – (i) functions (ii) food sources (iii) dietary deficiencies. F. Water – (i) functions (ii) sources. G. Nutritive values of foods – the food tables.	(Use a food table to support your classification) of foods consumed locally. – Collect pictures of people in different states of nutriture e.g., a picture showing a starved child, healthy child etc. (i) identify the nutrient(s) that is/are deficient. (ii) make up a nutrition story around each picture.	Mention/show different food tables to the students and explain how they are derived and used. With your help, the student should be able to conduct a comparative study of foods with food tables and thus appreciate why some foods are called protein foods, while others may be termed carbohydrate foods etc. This is the foundation on which further nutrition study rests.

NUTRITION AND HEALTH (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
3. Scientific Methods In Foods And Nutrition.	1. use simple standard food laboratory equipment with care and accuracy; 2. be familiar with common units of measure and conversions; 3. perform simple physical and chemical tests to detect presence of nutrients in foods.	1. Measurements, units and accuracy. 2. Protein Tests (a) Action of heat on complex protein. (b) Effect of alcohol on complex protein. c) Millons test. 3. Tests for fat Action of dry heat on fat. 4. Carbohydrate (a) Iodine test (b) Reaction of starch paste to litmus. (c) Effect of heat on carbohydrates 5. Water content of food — Residual moisture.	— Select an object in the laboratory, estimate the weight. What is the actual weight of the object? Repeat the exercise with other objects and observe the result. — Perform simple tests to detect the presence of: (a) Protein (b) Fat (c) Carbohydrate in foods.	Teacher should stress the importance of accurate measurement in weighing foodstuffs. Along with the conventional measuring equipment, teach the students to improvise by using "homely-handy" measures such as empty milk tins, spoons, empty margarine tins, bottles etc. In the absence of required equipment and materials in the foods laboratory, the chemistry laboratory may be used to perform simple experiments. Teacher should emphasize safety precautions in handling chemicals.

NUTRITION AND HEALTH (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
4. **Special Nutritional Needs.**	1. discuss the nutritional requirements of different age groups; 2. state the factors governing meal planning; 3. plan meals to meet individual nutrient requirement; 4. plan simple balanced meals for the family; 5. interprete a practical test assignment.	1. Nutritional needs of: (a) Infants and children (b) Adolescent (c) Adults (d) The Aged (e) Pregnant and lactating women. (f) Invalid (g) Convalescent 2. Planning of Balanced diets. — the food groups — menu writing. 3. Test interpretation.	— From a variety of foods on display, select items which you would prepare for breakfast and give the reasons for your choice. — From food items on the table, plan a meal for: an adult a toddler a teenage girl. — Record a one-day food in-take of a member of your family. Does the intake meet his or her nutritional requirements? — From a collection of foods on the table, choose those that you would specially recommend for: (a) a pregnant woman (b) a 5-year old boy.	Point out that the nutritional needs of most family members can be met without necessarily cooking different meals for different members. The meals for the adults can be modified to suit the toddlers and children. Emphasize or show how tests are interpreted in food and nutrition. Encourage students to give reasons for their choice.

YEAR 1

UNIT 2: KITCHEN MANAGEMENT

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO
1. Kitchen Equipment And Tools.	Students should be able to: 1. identify the types of equipment required in the kitchen; 2. list the types of kitchen; 3. choose kitchen equipment correctly; 4. use and care for equipment properly; 5. list different cleaning agents and classify them according to their uses; 6. select and apply cleaning agents on different equipment and tools appropriately.	1. Kitchen plans. 2. Cooking equipment — selection, use and care. 3. Kitchen utensils — selection, use and care. 4. Use of different cleaning agents and abrasives. (commercial and local)	– Test the rate of heat of conduction by different cooking utensils e.g., pots, pans, spoons etc. – Clean and care for various kitchen equipment. – Draw a kitchen plan. – Trace the flow of work in the kitchen. Is it well planned and arranged? How can it be improved?	A very nation of ment, ma what mate characteris material a ment is Extensive correct us and tools to show to student tial for the manipulati tion.
2. Safety in The Kitchen	Students should be able to: 1. handle kitchen equipment properly and carefully to avoid accidents; 2. explain the content and use of a simple first aid box; 3. explain simple first aid treatments that can be applied in different kitchen accidents.	1. Safety habits and devices in the kitchen. 2. Content and use of a first aid box. 3. Simple first aid treatments. – Cuts – Burns and scalds etc.	– Prepare a chart of safety rules to be used in the kitchen. – Prepare a first aid chart showing different treatments for different kitchen accidents.	The incul habits in process w ongoing d oratory ses essential developme lative skills

KITCHEN MANAGEMENT (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
2 *(Cont'd)*			– Practise how to treat a minor burn caused by: (i) careless handling of a hot cooking pot. (ii) careless handling of a match in lighting a stove.	
3. Hygiene	Students should be able to: 1. list rules on personal hygiene and observe them in the kitchen environment; 2. maintain a clean kitchen at all times; 3. recognise the dangers of kitchen pests and prevent them; 4. observe acceptable food practices pertaining to the selection, care and preparation of food; 5. identify diseases transmitted through foods; 6. differentiate between mild and severe cases of food infection/ poisoning; 7. be familiar with food sanitation laws and their enforcement.	1. Personal hygiene. 2. Kitchen hygiene: – general cleaning – waste disposal – pests and pest control. 3. Food Hygiene – handling of foods – food borne diseases – food sanitation laws.	– Clean a kitchen. – Prepare a checklist for observing the rules of: (a) personal hygiene (b) kitchen hygiene (c) food hygiene. – Make a food hygiene chart showing the food, disease, micro-organism involved, nature of the disease, unhygienic practices involved and treatment.	Explain how cleanliness and ventilation are essential in kitchen efficiency. Point out that cleanliness is of vital importance to both the cook and the consumer. Enlighten the pupils about relevant food sanitation laws and enforcement.

YEAR 1

UNIT 3: FOOD PREPARATION, STORAGE AND PRESERVATION

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEA
1. Food Study 1.1 Meats	Students should be able to: 1. discuss the value of meat in nutrition; 2. incorporate meats into meals; 3. recognise the different types of meat; 4. identify different cuts of meat; 5. list factors to consider and apply them when choosing meat; 6. cook different cuts of meat using appropriate methods.	1. Meat Cookery. (i) Nutritive value of meat. (ii) Types and cuts of meat – beef, veal pork, lamb, mutton, goat, game. (iii) Offals, (Organ meats) – liver, heart, tripe, kidneys, brain etc. (iv) Factors to consider when choosing meat. (v) Cooking methods – roasting, broiling, braising, stewing, frying boiling etc.	– Visit an Abattoir and a meat shop, observe the processes involved in slaughtering and portioning the meat. – Prepare or obtain a meat chart. – Prepare and cook different cuts of meat.	Most organ meats (require special cleanir preparation which : be explained and de trated to the student. Discuss the advantag disadvantages of each ing method.
1.2 Poultry	Students should be able to: 1. explain the value of poultry and other game birds in nutrition; 2. dress and cut poultry appropriately;	3. Poultry Cookery. (i) Nutritive value of poultry. (ii) Types of poultry: – chicken fryers, – boilers, roasters, – turkey – duck – goose.	– Compile a list of common birds and game birds that are eaten in the locality. – Prepare and cook different types of poultry.	Students should be the proper way t disjoint and debone p These are very im in recipes that c chunks, slices of, o poultry parts.

YEAR 1 UNIT: 3 FOOD PREPARATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1.2 *(Cont'd)*	3. Cook poultry using appropriate methods.	(iii) Factors to consider when choosing poultry. (iv) Preparation of poultry for cooking. (v) Cooking methods – stewing, frying, roasting, grilling etc.	Visit a cold store/market and compare the prices of (a) live whole chicken (b) whole fresh chicken (dressed) (c) frozen whole chicken (d) chicken parts (e) turkey parts.	
1.2.1 Eggs	1. identify different types of eggs; 2. discuss the nutritive value of eggs; 3. test for, and choose fresh eggs; 4. prepare, cook and serve eggs for a meal; 5. describe uses of eggs in cookery.	4. Eggs (i) Types of eggs – chicken, duck, goose. (ii) Nutritive value of eggs. (iii) Factors to consider when choosing eggs. (iv) Uses of eggs in cookery.	– Prepare a: (i) fried egg (ii) scrambled egg. – Prepare variations of omelette on the stove and in the oven. – Note the differences in appearance and taste of the products. – Prepare and compare boiled and poached egg.	Let students note any differences in appearance and texture of the oven and stove prepared omelettes. Discuss.

YEAR 1 UNIT :3 FOOD PREPARATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1.3 Milk And Milk Products	Students should be able to: 1. discuss the nutritive value of milk and its products; 2. differentiate between the different types of milk; 3. incorporate milk and cheese into cooking.	5. Milk and Milk Products (i) Nutritive value of milk and milk products; (ii) Types of milk: Fresh – pasteurized, homogenized, sterilized etc Evaporated Condensed Dry-powdered Cultured-Nono, Yoghurt. (iii) Types of milk products: (a) Types and origin of cheeses. (iv) Uses of milk and cheese in cookery	– Prepare a: (i) milk pudding (ii) baked/steamed custard (iii) flavoured milk. – Visit a supermarket to see different cheeses on display.	Practicals on uses of milk in baking may be deffered until flour mixture and confectionery are discussed.
1.4 Fish And Shellfish	Students should be able to: 1. list types of fish found in local waters; 2. discuss the value of fish and shellfish in nutrition; 3. incorporate seafood into meals.	6. Seafood Cookery (i) Nutritive value of seafood. (ii) Classes of seafood: – Fin fish – lean and fat, – Shellfish, Oysters and Mollusks.	– Visit a seaside/market and observe the fishermen/fish mongers and their catches/sales. – On a map of the country, identify the geographical parts where fishing is prominent noting the types of fish caught in each area; and the peak fishing season.	The students should be shown the proper way to dress fish, and the edible parts of some uncommon seafoods. The students should be aware of other seafoods that are not very common in their locality.

YEAR 1 UNIT: 3 FOOD PREPARATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
4. *(Cont'd)*	4. differentiate between fish and other seafoods; 5. dress and cut fish appropriately; 6. recognise and choose fresh fish during purchases; 7. cook different cuts of fish and other seafoods using appropriate methods.	(iii) Cuts of fish and dressing. (iv) Factors to consider when choosing seafoods. (v) Cooking methods – baking, grilling, boiling, steaming, poaching, frying, stewing.	– Make a list of types of fish found in our local waters and classify them. – Visit a local market and compare the price of fresh to frozen fish. – Prepare and cook different types, and cuts of seafood.	Emphasize the nutritive value of frozen fish in the diet.
1.5 Other Main Foods 1.5.1 Legumes And Vegetables	Students should be able to: 1. state the value of different classes of vegetables; 2. choose good quality vegetables and legumes during purchases; 3. apply appropriate preparatory measures to vegetables; 4. select appropriate methods of cooking that will ensure minimum loss of nutrients;	Legumes and Vegetables (i) Classes of vegetables: a. Green and leafy vegetables; b. Legumes and pulses; c. Roots, tubers and bulbs; (ii) Nutritive value of legumes and vegetables;	– Make a chart of vegetables found in Nigeria – showing: (a) classes (b) where grown (c) season available. – Discover as many unfamiliar vegetables as you can – classify them and find out how they are cooked and served. – Prepare and cook different vegetables and legumes.	With each cooking method, help the students to discover the advantages and disadvantages of the method used with each food. Using the food table, help the students to see how legumes can improve the nutritive value of a meal.

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YEAR 1 UNIT 3: FOOD PREPARATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1.5.1 *(Continued)*	5. incorporate legumes into meals to improve nutritional quality of meals.	(iii) Factors to consider when purchasing legumes and vegetables; (iv) Preparation of legumes and vegetables; (v) Cooking methods – steaming, boiling, roasting, baking, frying etc.		
1.5.2 Cereals And Grains	1. identify the different cereals and grains; 2. prepare flours and other products from cereals and grains.	Cereals and Grains (i) Types of cereals and grains. (ii) Nutritive values of cereals and grains. (iii) Preparation and uses of cereals and grains. (iv) Flour processing from the cereals and grains. (v) Cooking methods.	– Make flour from different grains. – Use the flour from the grains to prepare different foods.	Explain that there are other cereals and grains in other parts of the country. Show pictures or samples of grains and cereals available.

YEAR 1 UNIT 3: FOOD PREPARATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1.5.3 Fruits	Students should be able to: 1. differentiate between fruits and vegetables; 2. choose and purchase fresh fruits; 3. prepare and/or cook and serve fruits; 4. identify the seasons when some common fruits are abundant.	Fruits (i) Types of fruits (ii) Nutritive value of fruits. (iii) Factors to consider when choosing fruits. (iv) Methods of cooking fruits – baking, frying stewing etc. (v) Methods of serving fruits.	– Make a chart of fruits found in Nigeria showing: (a) classes (b) season available (c) whether it can be eaten raw (fresh) and/or cooked. (d) where grown.	The jamming method of cooking some fruits may be mentioned and the actual practical postponed until food preservation is discussed.
2. Condiments And Seasonings	The students should be able to: 1. recognise and list herbs and spices used in cookery; 2. identify the sources of common herbs and spices; 3. use spices and herbs effectively in cookery.	Herbs and Spices. (a) local (b) foreign (c) identification and uses.	– Collect and observe a variety of herbs and spices. Note the aroma – Group them according to their source. – Make a chart showing different condiments and their uses.	Stress that seasonings are meant to enhance the flavour of foods not dominate it and should thus be used sparingly.

TOPIC	PERFORMANCE OBJECTIVES	
1. Kitchen Planning	Students should be able to: 1. describe the different types of kitchen; 2. plan a kitchen; 3. identify the advantages and disadvantages of each type of kitchen with respect to economy, hygiene and overall efficient use of the kitchen.	1. 2.
2. Kitchen Equipment	Students should be able to: 1. select correct equipment for each task; 2. use each equipment correctly and care for it; 3. read and follow instructions guiding the maintenance of equipment; 4. recognise different types of institutional appliances and equipment; 5. check and retire equipment at the end of practicals.	1. 2.

YEAR 2

IT 1: KITCHEN MANAGEMENT

CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
Types of kitchen. Kitchen layouts: (a) Family kitchens (b) Institutional kitchens (c) Factors to consider when planning a kitchen.	– Visit different types of kitchen. – Collect magazine pictures of different kitchen layouts and write a brief description of each arrangement. – Sketch a kitchen layout and arrangement.	Stress that order, good ventilation and cleanliness are essential to kitchen efficiency. Discuss points that should be considered when arranging a kitchen. Stress the correct Time and Motion circuit – least movement – maximum efficiency.
Large equipment and fixtures – selection, use and care. Small appliances – selection, use and care.	– List the appliances that are new and find out how they are used. – Visit an institutional kitchen and identify the institutional appliances that are used.	Teach the use of modern kitchen gadgets. Stress the reliability of some old-fashioned kitchen equipment. They may serve as backup when modern gadgets fail. Two good examples are the grinding stone and the mortar and pestle. Discuss the importance of regular inventory. Emphasize the manipulative skills.

YEAR 2:

UNIT 2: FOOD PREPARATION, STORAGE AND PRESERVATION

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1. **Flour Mixtures And Confectionery**	Students should be able to: 1. discuss different types of flours in cookery; 2. identify raising agents used in cookery; 3. describe how different raising agents work when used in flour confectionery; 4. describe basic methods of preparing flour mixtures e.g., batters, doughs etc; 5. use different methods to pre pare cakes, and breads; 6. be familiar with standard constituents of different flour mixtures; 7. descriminate between good and bad quality flour products; 8. discuss the reasons for a bad quality flour product. 9. develop the art of decorating cakes. 10. list various flavourings used in cookery. 11. differentiate between natural and artificially flavoured foods;	1. Flours in cookery. 2. Raising Agents: (a) Air (b) Baking powders (c) Yeast (d) Palm Wine. 3. Flour mixtures: (a) Cakes, buns and sweets (b) Pastries (c) Breads 4. Food Flavourings and colouring. (a) Natural and artificial flavourings. (b) Food colouring materials.	– Perform series of experiments on action of raising agents. – Taste a decorated cake and identify the flavourings and colourings used. – Select some cake recipes and identify the various methods of flour confectionery involved in making them. – Prepare cakes, pastries and breads and evaluate the products. – Prepare some flours from local foodstuffs and utilize same in baking.	Explain thoroughly how each of the raising agents work. Some illustrative chemical equation should be introduced to students. Emphasize the importance of using correct amount of food colouring. Excessive amounts over a period of time can be toxic and injurious to health. A great deal of manipulative skill is involved in this topic, therefore students should be encouraged to develop these skills by practising. Encourage the use of local flours for economy, their availaibility and nourishing effects.

YEAR 2: FOOD PREPARATION,.....(Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1. *(Cont'd)*	12. select and appropriately use flavourings to improve the final food product; 13. list various food colourings; 14. select and use the correct amount of colouring in food.			
2. **Storage And Preservation Of Foods.**	Students should be able to: 1. explain why foods are preserved; 2. determine what foods to preserve; 3. describe the methods of preserving foods. 4. preserve some foods using simple preservation methods; 5. store foods adequately; 6. identify convenience foods in the local markets; 7. discuss the advantages and disadvantages of convenience foods; 8. recognise dangers and signs of spoilage and expiration in convenience foods; 9. use convenience foods in preparing balanced meals in a minimum of time.	1. Preservation of foods. a. preparation of foods for preservation. b. methods of food preservation. 2. Storage of foods. 3. Convenience foods – a. Types b. Uses c. Advantages and disadvantages d. Guide lines for selecting convenience foods.	– Observe various preserved foods on display and determine the various methods of preservation used. – Prepare storage bins and store food items used in the laboratory. – Observe a display of convenience foods and comment on their uses. – Plan and prepare meals using some convenience foods. Show how time and energy are saved in such use of the convenience foods. – Visit supermarkets, local markets and food industries. Conduct a survey of convenience foods.	Emphasize that when preserving foods, it is essential that all agents of spoilage are either destroyed or rendered inactive, that they are also prevented from re-entering the preserved foods. Let the pupils understand that convenience foods are not always desirable. Pupils should be encouraged to use fresh foods as often as possible.

YEAR 3

UNIT 3: CONSUMER EDUCATION

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1. **Consumer Education**	Students should be able to: 1. obtain correct information about consumer goods; 2. discuss the disadvantages of impulsive buying; 3. identify various consumer agents; 4. explain how consumer agents operate; 5. state the functions of consumer related agencies and organizations on the international and local levels; 6. identify consumer oriented programmes and their functions; 7. discuss the advantages and disadvantages of co-operatives.	1. Principles of consumer education. 2. Consumer Agents: – Markets – Distributors – Hawkers – Sales Agents 3. Government agencies and regulations: a) World food agencies b) Federal agencies functions and regulations c) State agencies – functions and regulations. 4. Community programmes: a) Co-operatives; b) Mass media.	– Compile a list of some major distributors of goods in your locality. Find out how they operate. – Compile a list of international and local agencies. Make a chart showing their functions and regulations. – Organize a "consumer action" group and make a complaint about a bad food product to a manufacturer or supermarket manager. – Find out how to organize a co-operative.	Discuss the consumer programmes on the media and health pages of newspapers. The host/hostess of a media consumer programme, or other experts may be invited to give a talk.
2. **Food Budgeting**	Students should be able to: 1. prepare a family budget; 2. identify the primary and secondary needs of a family; 3. discuss the factors that influence the family budget;	1. The Family Budget. a) Primary and secondary needs. b) Factors to consider when budgeting. 2. The Food Budget. a) factors to con-	– Prepare a family budget. – Prepare a food budget. – Compile a food list for the month and cost each item	Let the students prepare budgets for a low and a middle income family. Give pupils pertinent information on each family such as family size, members occupation, income, etc.

YEAR 3: CONSUMER EDUCATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
2. *(Cont'd)*	4. prepare a food budget; 5. be aware of nutritional needs of family members when making a food budget; 6. compile a food price list on periodic basis; 7. keep accurate record of food expenditure; 8. keep food expenditure within budget.	sider b) shopping list c) petty cash d) food costs.	— Compile a food list for the ramadan month or Xmas month or one of the other important festivals and cost the items.	
3. Choice And Storage Of Foodstuffs	Students should be able to: 1. explain the value of purchasing food items in bulk; 2. explain the value of buying foods in season; 3. prepare a shopping list; 4. shop for the best quality foods at low prices; 5. scrutinize and evaluate price lists and consumer pages of newspapers and other advertisements; 6. differentiate between perishable and non-perishable foods; 7. store perishable and non-perishable foods properly.	1. Bulk purchasing: — the shopping list — market survey — cost analysis 2. Storage of foods: — perishable foods — non-perishable foods. 3. Storage equipment.	— Compare cost of selected foods in the local market. — Compare prices of different cuts of meat. — Find out the unit price of a 50 kilogram bag of rice and compare it to the unit cost of a tin of rice. Which is cheaper? — Make a chart of perishable and non-perishable foods, showing the season when abundant and how to store them.	Explain some common terminologies, e.g., price list, shopping list, food list, bulk buying, commercial foods, home-made foods brand name, net weight gross weight.

YEAR 3

UNIT 1: NUTRITION AND HEALTH

TOPIC	PERFORMANCES OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1. Special Diets.	Students should be able to: 1. define the terms vegetarian, invalid, convalescent. overweight and underweight; 2. differentiate between the different types of vegetarians; 3. plan balanced vegetarian diets that meet nutritional requirements; 4. plan nutritionally adequate diets for the invalid and convalescent; 5. be familiar with the dietary needs of persons suffering from fever and infection; 6. plan weight reduction diets; 7. plan adequate diets for the underweight.	1. Vegetarian diets. — Strict vegetarian — Lacto-vegetarian — Lacto-ovo-vegetarian. 2. Invalid and convalescent diets. 3. Diet in fever and infection. 4. Diet for overweight and underweight.	— Plan a one-day diet for the following: a) Strict vegetarian b) Lacto-vegetarian c) Lacto-ovo-vegetarian d) Invalid e) Child with fever f) Overweight adolescent g) Underweight child.	Explain the terms invalid and convalescent. Discuss the points to consider when catering for the invalid and convalescent. Stress that vegetarian diets have the tendency to be nutritionally inadequate hence conscious effort must always be made to safeguard against deficiencies.

YEAR 3

UNIT 2: ENTERTAINING

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1. The Art Of Entertaining.	Students should be able to: 1. recognise different forms of entertaining; 2. plan for entertainment; 3. observe rules guiding entertainment 4. demonstrate different table-settings; 5. display good table manners; 6. observe rules for waiting at tables; 7. clear tables orderly after meals.	1. Being a good Host/ Hostess. a) Planning ahead b) Issuing of invitations and receiving guests 2. Table settings. – formal – informal 3. Serving of foods – waiting at tables – clearing after meals. 4 Being a good guests. – response to invitations – table manners	– Prepare different table-settings. – Plan a buffet dinner. – Write an invitation for a sweet-sixteen birthday party. – Respond to an invitation to a birthday party. – Organize a formal dinner party and observe the table manners of the dinners. – How will you cope with two unexpected friends who arrived just when you are about to eat your dinner?	Encourage the pupils to use their imagination and creativity in planning an entertainment.
2. Cultural Food Habits	Students should be able to: 1. recognise and appreciate traditions that are different from one's own; 2. develop interest in the traditional dishes of other tribes and families.	1. Food habits. – fads and fallacies – taboos. 2. Traditional dishes. – dishes from different localities.	– Find out dishes that are peculiar to a particular tribe. – Trace the background of some traditional dishes.	Encourage pupils to discuss their traditional dishes and to compare them with others.

YEAR 3: ENTERTAINING (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
2. **Cultural Food Habits** *(Cont'd)*	3. identify local foodstuffs that can be substituted for foreign ones in foreign dishes; 4. willingly try foreign dishes thus enrich their food experiences; 5. list foods that are forbidden or not consumed in their locality	3. Foreign dishes – a) – Indian – European – Chinese – American etc. Other African countries. b) Use of local foodstuff in foreign dishes.	– Identify food fads, fallacies or taboos, associated with the traditional food habits. – Identify the nutritional loss caused by these taboos, fads and fallacies. – Suggest ways of supplementing the nutritional losses. – List some foreign dishes. – Study the recipe of a foreign dish – which of the foodstuffs used are familiar. – What local foodstuffs can be substituted. – What are the methods of cooking used?	Encourage pupils to sample foreign dishes that are available. Explain to pupils that there are times when a dish appears foreign but the ingredients may be common and familiar to the pupils. The method of preparation may be the differentiating factor.
3. Foods for Special Occasions.	Students should be able to: 1. identify foods that are suitable for different occasions; 2. identify occasions that are special or observed in the locality/ country. 3. plan meals for special occasions. 4. prepare and serve different foods for special occasions adequately.	Planning of parties. – birthday – naming ceremonies – weddings – cocktails – buffet etc.	– List some special occasions and suggest foods that are suitable for them. – Find out why certain specific foods are served at parties e.g., naming ceremonies. – Plan the foods and drinks that will be served at a sweet-sixteen birthday party	Encourage students to apply their knowledge of foods and artistic talents to make everyday foods look more enticing for an occasion. Encourage the students to include nourishing foods in the menu.

YEAR 3

UNIT 3: FOOD PREPARATION, STORAGE AND PRESERVATION

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
1. Beverages	Students should be able to: 1. prepare light beverages; 2. select and prepare juices and drinks for different purposes and occasions.	A) Non-Alcoholic Beverages 1. Coffee and Tea – methods of preparation and service. 2. Cocoa drinks – Hot cocoa, ovaltine etc. 3. Milk and Egg drinks – milk shakes, Egg-flip, Egg not etc. 4. Fruit juices and drinks – lemonade, orangeade, pineapple juice and drink, punch etc. 5. Other drinks – beef tea, lemon grass. B) Alcoholic drinks – beer, wine, spirits.	– Collect interesting recipes for different beverages and make a recipe book. – Prepare different fruit juices and drinks. – Prepare coffee using different methods and evaluate the products. – Make a list of alcoholic and non-alcoholic beverages.	In discussing the nutritive value of beverages, the teacher may have to provide the information on coffee and tea as some food tables do not carry information on them. Emphasize the differences between non-alcoholic and alcoholic beverages.
2. Rechauffe (Leftover Cookery)	Students should be able to: 1. explain what is meant by Rechauffe 2. describe thrifty ways to make use of leftover foods.	1. Leftover foods – (a) Reheating or warming of leftover foods.	– Convert leftover cooked foods into new dishes.	Stress that pupils should look for signs of contamination in leftover foods. Discourage pupils from cooking excessive quantities of foods for meals.

YEAR 3: FOOD PREPARATION (Cont'd)

TOPIC	PERFORMANCE OBJECTIVES	CONTENT	SUGGESTED ACTIVITIES	NOTES TO THE TEACHER
2. *(Cont'd)*	3. convert leftover foods into new and appetizing dishes; 4. explain why reheated leftover foods may be nutritionally inferior to freshly cooked foods; 5. supplement leftover foods with fresh ones to improve nutritional values; 6. develop a sense of economy with foods.	(b) Use of leftover foods in making new dishes. – rechauffe of meat – rechauffé of fish – rechauffé of vegetables – rechauffe of other foods.	– Store leftover foods properly.	Stress the importance of proper storage of leftover foods.
3. Cookery Assignments	Stduents should be able to: 1. interprete a given cookery assignment; 2. plan for practical work; 3. execute a cookery assignment.	Practical and theoretical work. – Test interpretation; – Planning for practical work.	– Develop some cookery assignment cards. – Execute cookery assignments.	Assignments should be carefully thought out so that they challenge the pupils and at the same time help to develop their self-confidence. The students should be given information about what is expected at external examinations if the procedure used in class is different.

APPENDIX VII

DISTRIBUTION PATTERN OF TEACHERS QUESTIONS BY LEVELS (PRE AND POST TESTS)

COGNITIVE QUESTIONING LEVELS	G R O U P S			
	EXPERIMENT		CONTROL	
	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
Knowledge	50	40	50	49
Comprehension	34	20	39	48
Application	19	13	17	20
Analysis	12	19	5	6
Synthesis	10	20	4	4
Evaluation	11	15	3	4
TOTAL	136	127	118	131

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APPENDIX VIII

PRE-TEST DISTRIBUTION PATTERN OF TEACHERS QUESTION BY LEVELS IN THE SELECTED SCHOOLS

EXPERIMENTAL SCHOOL	LOWER COGNITIVE QUESTIONING LEVELS			HIGHER COGNITIVE QUESTIONING LEVELS		
	KNOWLEDGE	COMPREHENSION	APPLICATION	ANALYSIS	SYNTHESIS	EVALUATION
A						
1	3	2	2	1	1	1
2	4	3	1	1		1
3	4	2	1	1		-
B						
1	4	1	-	1	1	-
2	3	2	2	-	-	-
3	3	2	2	-	-	-

4 5	3 2	2 4	1 1	- 1	1 1	1 1
C 1 2 3	 3 3 2	 2 2 2	 - 2 -	 1 1 1	 1 - -	 1 1 1
D 1 2	 5 3	 2 -	 - 2	 1	 1 1	 1 -
E 1 2 3	 3 3 2	 3 2 3	 2 1 2	 1 1 1	 1 1 1	 1 1 1
TOTAL	50	34	19	12	10	11

CONTROL

CONTROL	KNOWLEDGE	COMPREHENSION	APPLICATION	ANALYSIS	SYNTHESIS	EVALUATION
F						
1	4	2	1	1	-	1
2	5	2	2	-	-	-
3	3	3	2	-	-	-
G						
1	3	3	2	-	1	-
2	3	4	2	1	-	-
H						
1	4	3	2	1	-	1
2	4	3	-	-	-	-