# Fundamental Theories and Educational Contents of Diet and Nutrition Education Adapted to Human Development and Behavior Changing

## ——Proposes Regarding Four Areas of Diet and Nutrition Education Corresponding to Learning Stages Founded on Theory by Piaget, J. and Behavior Changing Theory by Prochaska, J. concerning Level-Based Instruction on Healthy Eating Behavior and Instruction of Practice (Modified by Maruya, N.)——

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## Introduction

In Japan, the Basic Law on Diet and Nutrition Education was established in 2005, and the Basic Plan for the Promotion of Diet and Nutrition Education that followed in 2006. As concerns one field of diet and nutritional education, school-based diet and nutrition education is desired that the six goals will be achieved via "Instruction and Guidance concerning Diet and Nutrition Education within Schools", 2007[1)]

Especially in the nine years of elementary and middle school, children show a rapid development in learning abilities; this is the period when the basis of dietary habits that may last a lifetime are formed. Therefore, as a theme of diet and nutrition education research, it is necessary to perform research that considers the introduction and application within diet and nutrition education of learning development theories and behavior modification theories. The nutri-

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tion teacher system was established in 2005; these teachers are to be responsible for school-based diet and nutrition education. Today, when the place of diet and nutrition education within schools has been clarified and established, what is needed is research on systematic diet and nutrition education that is based on learning development theories.

It is thus necessary to modify education contents and methods from a pedagogical standpoint, and to perform instruction and guidance that is in accordance with human development.

In the present paper, upon the basis of pedagogical theory that considers diet and nutrition education, considerations will be made on 1) Piaget's learning development theories, a well-known developmental theory of learning capabilities, and the possibility of its application to diet and nutrition education adapted to development, and 2) the classification of four learning fields while considering the systematic nature of diet and nutrition education and concrete instruction and guidance in accordance with developmental stages.

## 1. Learning Development Theory Founded on Jean Piaget and Their Application to Diet and Nutrition Education Suited for Development, and Instruction of Practice

In regards to learning development theories that can become standards for selecting learning contents and methods that take into consideration the development of learning capabilities, the theory of Piaget J.[2~6] (Jean Piaget, psychologist) is effective. As shown in Figure 1, J. Piaget considered two stages that are divided at ages (11–12 years old) roughly corresponding to the upper elementary school years: the prior stage he called the concrete operational stage, and the latter, the formal operational stage.

(1) Concrete operational stage: Ages 6–7 to 9–10 (lower and middle elementary school years)

The first stage is one where, while observing the behavior of others, it is easy for the child to form behavioral patterns via the modeling of behavior-this is called the "concrete operational stage." From these facts, two areas are suitable for the contents of diet and nutrition learning in the lower and middle elementary school years-

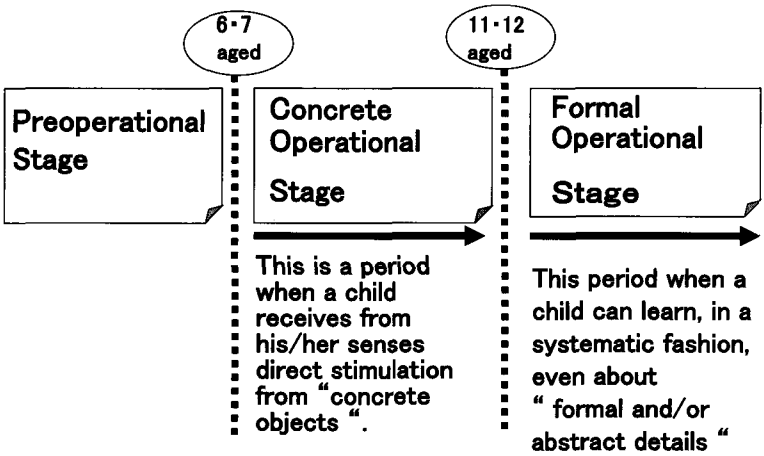


**Fig. 1 The Theory of Operation Development (Piaget, J.)**

namely, "learning that raises food sensitivity and consciousness" and "learning that raises observation and modeling of eating behavior."

(2) Formal operational stage: Ages 11 and 12 (upper elementary school years) and older

Learning from ages 11 and 12 and thereafter is called the "formal operational stage," as it is this period when a child can learn, in a systematic fashion, even about formal and/or abstract details. As shown in Figure 1, learning contents that are appropriate for initiating within this period are "knowledge-based learning about diet and nutrition."

(3) Four Areas of Diet and Nutrition Education Corresponding to Learning Stages, and Concrete Instruction and Guidance

**Area I in fig. 2**

1) Sensibility learning of foods and diet

In the Handbook on Diet and Nutrition Education for Children Students of the Swedish National Agency for Education, the following words of Magnus Pyke are quoted: "A human must eat what is necessary for him. However, he will choose what he really likes. Therefore, his health can only be sustained when he likes what is necessary for

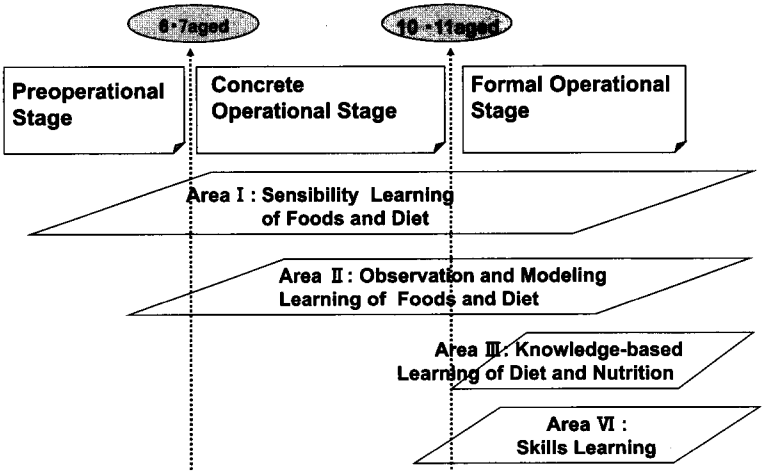


**Fig. 2 Four Areas of Diet and Nutrition Education Corresponding to Learning Stages Founded on Theory by Piaget, J. (modified by Maruya, N.)**

him." These words suggest that since eating behavior is influenced by basic liking concerning foodstuffs, education regarding eating feelings is a necessity. Tastes acquired in infancy and childhood have effects on health aspects of eating habits throughout one's lifetime. Among eating sensibilities, humans are born with an ability to evaluate tastes, and food sensibilities undergo further growth during infancy and the toddler years. Thus, in infancy, preschool years, and during the lower elementary school years, it is vital that learning provides-in a deep and lasting way-a child abundant and healthy sensibilities toward food. Also, within diet and nutrition education, it is important to foster awareness and a desire to lead a healthy dietary lifestyle via the raising of consciousness.

2) Adaptation to development and concrete instruction and guidance

The lower and middle years of elementary school are the years of Piaget's "concrete operational stage"; this is a period when a child receives from his/her five senses direct stimulation from "concrete objects," and when food likes can be easily imprinted. The "pickiness" (finicky tastes) that children often show about foods during this period has its basis in sensibility-related likes and dislikes. Thus, to ensure

that children are exposed to a wide variety of different food sensations, within school meals, it is desired that a variety of cooking methods be challenged so that students may experience eating many different food types. Daily menus characterized by the fact that they can be actually looked at, smelled, and tasted with interest are "concrete learning actual materials from daily life" that are appropriate for the concrete operational stage.

Further, plant cultivation-related education (also called "food agriculture education") has the effects of heightening interest, concern, and sensibilities toward food. By raising, monitoring, and taking care of the growth of the plants that serve as food materials, and via the opportunities such brings for actually touching and smelling raw plants, a love of such plants is fostered within students. In the living and environmental science classes of the lower elementary school years and in the integrated-learning *(Sogoteki-gakushu)* classes that start from the third elementary school year, etc., it is possible to perform practical eating life-related education in terms of sensibilities via instruction and guidance on cultivating food plants. "A consciousness of living a healthy food life" is also fostered via school meals and via the instruction and learning within healthy life *(Hoken)* classes that begin from the third elementary school year. When quizzes, puzzles, and other tasks are integrated within the instruction that relates food and diet to health, attention is paid to sensibility-related elements in the learning itself, as it is of vital importance that progress be made via simple and easy learning methods.

**Area II in fig. 2**

1) Observation and modeling learning of foods and diet

As for observation and modeling-based learning, the Social Learning Theory of Albert Bandura[7~9] is well known. Observing the acts of another person (the "Model") stimulates a feeling that one wants to do the same thing (behavioral desire): thus, if the Model is performing desirable dietary behavior, then, by imitating that behavior, a feeling of self-confidence (Self-Efficacy) towards such behavior is engendered. In the period from infancy to around age 10, rather than trying to get a child to think about eating, it is easier to have the child modeling the dietary behavior of another; it is thus effective to utilize group meals within the school.

2) Adaptation to development and concrete instruction and guidance

At school meal times from the lower elementary school years on, one can provide goals such as "Try to eat just a little bit of even foods you don't like," etc. Also, instruction and guidance can be provided such that by observing and imitating the positive, desirable dietary behavior of students in the same class, students can gain the "Self-Efficacy" that comes from saying, "I can eat it." Further, in the life and environmental science classes of the lower elementary school years and in the integrated-learning *(Sogoteki-gakusyu)* classes that start from the third elementary school year, etc., one can give students opportunities for direct observation via visits and tours to a variety of food production sites and local food culture spots, etc. In the home economics *(Kateika)* courses of the upper elementary school years, via the foodstuffs and menus used in cooking practice, and via observation and modeling of the food preparation techniques of teachers and classmates, etc., interest in food and in cooking techniques, etc., can be stimulated.

**Area III in fig. 2**

1) Knowledge-based learning of diet and nutrition

"Knowledge-based learning" is divided into two major parts: the passive learning of knowledge, and learning that puts to work metacognitive operations. Metacognition is "the further monitoring of one's own learning, and the ability to activate learning and to control learning progress.[10~11] It is known from the research of cognitive science that, for the development of metacognition, the use of simple knowledge in a variety of actual life tasks is effective. Among elementary school students, there is a gradual development of metacognition, and, in general, a certain state is achieved by around age 11 or 12.

2) Adaptation to development and concrete instruction and guidance

First stage (lower and middle elementary school year students): In this period, when metacognition has not sufficiently developed, learning involving concrete items as educational materials is suitable also for knowledge-based learning about foodstuffs and nutrition. In the lower school years, "three colors nutrition" learning is performed, whereby the three major working effects of nutrition are separated

into three separate colors (red, green, yellow) that easily make an impression (on lower elementary school-years students as well), and foods are classified into these colors according to their respective working effects.

Also, third graders begin to take healthy-life *(Hoken)* classes, where they learn knowledge that links daily dietary habits to health. At this age, however, it is difficult to gain a conceptual understanding of "health." The aim here is thus to encourage understanding via liking this knowledge to the daily home life of students.

Second stage (upper elementary school years, middle school students and older): In this age, students enter into the "formal operational stage" under the Piaget, J. development classification, and metacognition capabilities, too, reach a certain stage. In regards to nutritional effects as taught in this period, students become able to understand such things as abstract knowledge and formal classifications, etc. Home economics courses begin from the fifth elementary school year, and here, in regards to the "three working effects of nutrition," students learn thoroughly knowledge about the basic fundamentals of nutrition, and they are instructed to use that knowledge by thinking up simple menus that are nutritionally balanced.

**Area VI in fig. 2**

1) Skills learning of diet and nutrition

It is important that skills acquisition is such that knowledge, sensibility, and consciousness-based learning results are linked to desirable dietary behavior food behavior modifications. There are two kinds of skills: technical skills (skills regarding techniques) and life skills (skills regarding the psychology of daily life). Eating technical skills include cooking techniques, and safe food selection and preservation techniques. As for life skills, these are defined by the World Health Organization (WHO) as "abilities for adaptive and positive behavior that enable people to deal effectively with the demands and challenges of everyday life," and a variety of life skills are promoted. Those that are effective when applied to food behavior modification include decision-making skills, goal-setting skills, and stress management skills.

2) Adaptation to development and concrete instruction and guid-

ance

From the upper elementary school years, there is a remarkable development of hand-using technical skills in tandem with the growth of limbs, and skills are learned such that knowledge is utilized in forming behavioral habits. As for technical skills, home economics courses begin from the fifth elementary school year, and progress is made on practical learning of cooking and food selection and preservation skills in accordance with the development of practical capabilities.

As for the activation and use of life skills, children learn decision-making skills, which are utilized in efforts to change habits of children who, for example, skip (do not eat) breakfast. As for goal-setting skills, there is a learning of processes involving efforts to set goals to ensure healthy snacking, including not selecting foods that have large amounts of sugar, salt, or oil, and so on. As for stress management skills, children are taught to know that stress has effects on eating behavior, including overeating and refusing to eat, and they learn processes that aid them in their efforts to control undesirable eating behavior that stems from stress.

## 2. Behavior Changing Theory[12~17] Founded by James Prochaska concerning Level-Based Instruction on Healthy Eating Behavior and Instruction of Practice

There are individual differences in regards to the effects of practical levels healthy eating behavior and dietary habits. Therefore, for individuals or small groups of persons at different practical levels, instruction and guidance towards behavior modifications are performed according to different individual levels. Here, explanation is provided of the Stage Model of Behavior Change of Prochaska, J. the theory which has garnered attention in recent years and its application. Prochaska, J. divides healthy behavior into five stages, and the theory is thus called the "Five Stage Model" (Fig. 3). The first step is for the person to have an actual grasp at what stage he/she is currently at, and as to why he/she is at that specific stage. Then, after consideration as to what type of methods can best guide the individual to his/her next stage, instruction is provided such that there is a sequential progression from stage to stage.

(1) A (Precontemplation Stage) → B (Contemplation Stage): A is

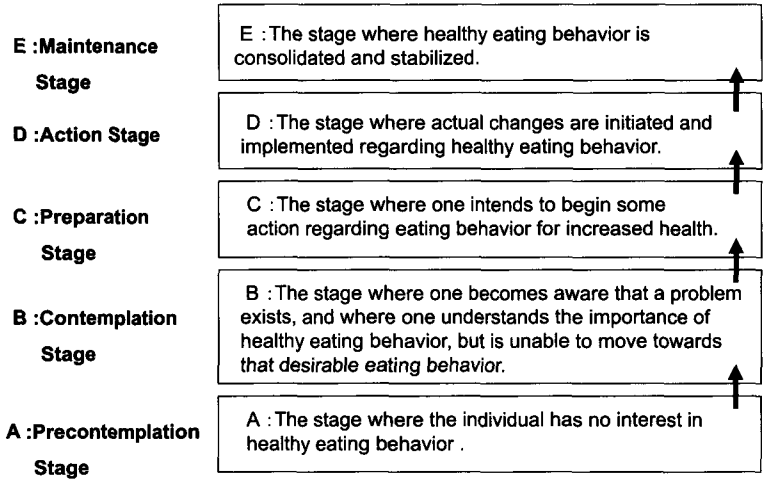


**Fig. 3 Behavioral Stages of Changing Model (Prochaska, J. modified by Maruya, N.)**

the "stage where the individual has no interest in healthy eating behavior" (the so-called "Precontemplation Stage"). One sees many students in the upper elementary school years and in middle school who express a lack of interest. B is the stage where "one becomes aware that a problem exists, and where one understands the importance of healthy eating behavior, but is unable to move towards that desirable eating behavior." From the upper elementary school years on, since this is a development stage where a child can understand knowledges about sickness and health, it is necessary to utilize educational materials that spark interest, and to have students understand "the merits of healthy eating behavior modification, and the risks of failure to modify such behavior." To support a child in the progression to the next stage, B, where the child "understands the importance of healthy eating behavior," it is effective to perform, for individuals or small groups, detailed guidance that raises knowledge-based understanding and that stimulates sensibility-related interest and concerns.

(2) B (Contemplation Stage) → C (Preparation Stage): C is the "stage where one intends to begin some action regarding eating behavior for increased health." To support a child in the progression from B to C, it is necessary to further increase motivation such that

behavior can be initiated. An analysis and summarization should be made of factors (eating environmental and technical factors that are preventing the child from beginning healthy eating behavior, and provide instruction and guidance such that the child himself/herself has a desire to solve, on his/her own initiative, the problems that are preventing his/her behavioral changes.

(3) C (Preparation Stage) → D (Action Stage): D is "the stage where actual changes are initiated and implemented regarding healthy eating behavior." To support a child in the progression from C to D, it is necessary to perform, in concrete detail, specific improvements in the eating environment, and to urge behavioral implementation via such things as technical skills including simple cooking and food-selection skills. When the child is determining just where to begin with his/her healthy eating behavior, one can apply the life-skills learning described above. It is especially important that is performing "decision making" and "goals setting."

(4) D (Action Stage) → E (Maintenance Stage): E is "the stage where healthy eating behavior is consolidated and stabilized." To progress from stage D to E, the effects of the desirable eating behaviors of classmates, teachers, family members, etc., impact the maintenance of behavior. If desirable eating behavior is continued within the child's environment, and he/she has frequent opportunities for observation and modeling, then the child himself/herself will be able to consolidate and maintain continuous habits of desirable behavior modification.

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