

Zhang, L. & Zhang, Y. (2019). The design of knowledge building in family setting- A case study of a boy's food education. Paper presentation at the *2019 Knowledge Building Summer Institute: Knowledge Building Practices and Technology for Global Hubs of Innovation*. March 15-16, 2019, Beijing, China.

## The Design of Knowledge Building in Family Setting ——A Case Study of a boy's Food Education

Li Zhang, Nanjing Teaching & Research Division for Vocational (Adult) Education, Nanjing/P.R. China.,  
nj\_zl@163.com

YiBing Zhang, Nanjing Normal University, Nanjing/P.R.China., zhyb304@126.com

**Abstract:** There are lots of learning opportunities for Knowledge Building in family setting where is an important place for family members' daily life and dialogue. How to develop knowledge building projects based on varied family background needs well-designed informal learning intervention. The researcher of this study is a mother of a 3-year-old boy, the research story started from her guidance her son's choosing breakfast, and extended to Diet Education. In the KB learning context, 3 types of intervention strategies were used: basic intervention, select-able intervention and emerging interventions. 5 family members have been gradually involved in the knowledge building projects about the boy's everyday diet. They raised authentic problems, real ideas and build diet theories together with the boy. The researcher wrote more than 30 observing diary, took nearly 100 photos and videos in 7 weeks and data resources also have the content of family KB wall and family members KB discourse. Throughout qualitative and quantitative analysis, the preliminary findings are: The boy has built up knowledge about food in some degree, such as the process of food planting and production, the functions of various nutrients contained in food, balanced diet, dining etiquette, etc. Moreover, there has been a significant improvement in his behavior including dietary choices, dining etiquette, etc.

**Keywords:** Knowledge Building, informal learning intervention, family learning setting, diet education, KB discourse

### Introduction

I, a researcher as well as a mother of a 3-year-old boy who used to be a particular fussy and capricious eater. Since my kid was 2 years old, I have been troubled by his unhealthy eating habits for a long time.

Occasionally, I came across the concept Food Education, which is originated in Japan and defined as the carrier of education. The goals of learners' ability to food choice, awareness of ecological protection, capability of leading a healthy life and desire to promoting social harmony and progress will be achieved through cognizing the knowledge about food (Li, 2006). In recent years, some attention has gradually paid to food education in China, while some researchers have tried to develop some curricula of food education in kindergartens. Moreover, Family, as the most natural learning setting, is also advocated by many experts (e.g., Li, 2006; Wang & Huang, 2016; Tang, 2016) to develop Food Education.

Knowledge Build (KB) pedagogy deeply excavates the human collaborative learning mechanism, which comes from and transcends nature. A large number of studies have shown that by engaging in Knowledge Building, students have made significant improvement in grasping of knowledge, vocabulary, writing and 21st-century skills including creativity and collaboration (Zhang, 2012). However, most of the existing KB studies are carried out in formal education, in which teachers often need to create context. However, family, as the most significant place for family members to live, eat and communicate, is obviously the natural and vivid learning context for food education. In addition, parents, as the kids' closest relatives, can always accurately perceive the kids' zone of proximal development. All these are favorable conditions for the implementation of knowledge building in family setting.

Therefore, in order to improve the kid's improper eating habits and to cultivate his '21st-century skills' in the process of parenting, the idea of food education for my kid in family setting with KB Pedagogy came into being.

### Research Questions

The main research question is whether the design of Knowledge Building based on Family Setting can promote a three-year-old boy's diet cognition and the change of diet behavior?

## Methodology

### Research Context and Participants

The research context is at my home, and the participants including five family members, namely:

I, researcher as well as the kid's mother

My kid, 38-month-old boy, in nursery school now

The boy's grandparents, 70 years old, both of whom have certain traditional ideas about food, nutrition on their mind, are the leaders of the whole family's diet

Dad, a pharmaceutical researcher, only stays at home on Saturdays and Sundays

### Sources of Data

The sources of data,

1. more than 30 observation diaries recorded within 7 weeks;
2. more than 100 videos and photos taken by myself;
3. all of the contents recorded on the Knowledge Building wall in my family;
4. the collected audio test record and text record after 7 weeks.

## Informal learning interventions

The learning design of Knowledge Building related to food, which is based on 12 principles of knowledge building, started on December 1st, 2018 in my family.

Because the boy is so young that he has finite initial cognition about nutrition, the first learning intervention was carried out with the guiding question 'what is the nutrition of soybean milk?', I raised from the situation of choosing his breakfast. In the following 7 weeks, through the daily/weekly relatively fixed basic intervention, the purposive select-able intervention when available, the daily accidental intervention with the intention of capturing the learning opportunities, promoting learning activities and leading development, and the topics related to 'How is food grown and prepared? What kind of nutrition does each food material contain? How to achieve a balanced nutrition? What are the improper and unacceptable behaviors during meals? etc.', the potential learning opportunities have been successfully developed into a series of learning situations of Knowledge Building, five family members have been gradually involved in the knowledge building project related to kid's daily diet as well. It's worth noting that the kid not only has built up his own systematized knowledge of food, but also there has been a significant improvement in dining behaviors 7 weeks later. Let me set the question 'how to achieve a balanced nutrition?' as an example to illustrate the application of three types of strategies.

### For example: How to achieve a balanced nutrition?

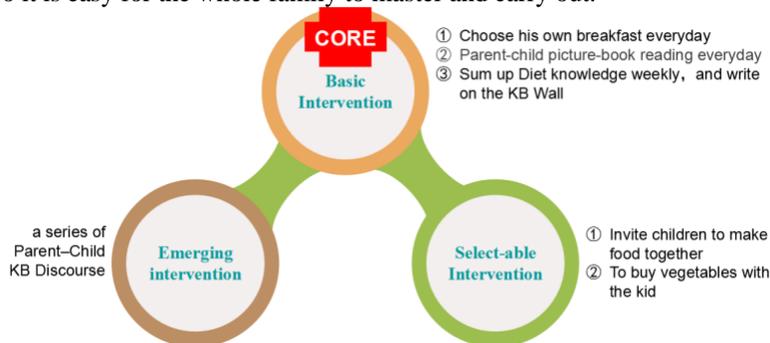
There are three basic interventions including the choice of daily breakfast, the daily reading activity of parent-child picture books, weekly summary of diet knowledge and the design of the KB wall.

There are two select-able interventions, one is to invite the kid to make food, and the other is to take him to buy vegetables together.

Accidental Intervention consists of a range of parent-child discourse.

Above three types of interventions are designed to form a logically uniform system. Based on basic intervention, appropriately applying select-able intervention and Accidental Intervention, the kid's ability of knowledge construction related to balanced nutrition can be improved consciously and greatly.

Each strategy, which is simple enough for application without high technical threshold, can be used alone, also it is easy for the whole family to master and carry out.



The following examples illustrate the various strategies

### Basic Intervention:

#### E.g. The parent-child picture book reading

Parent-child picture book reading is a significant intervention strategy for there are variety of vivid and systematic knowledge about nutrition inside of the picture books, which are regarded as authoritative readings. Moreover, a lot of knowledge-building discourse can be aroused and generated in the process of parent-child reading. Please have a look at the dialogues recorded during picture book reading in my diary. While reading, nurturers can explain concepts, ask leading questions, and involve kids into the relevant issues discussion. The parent-child reading strategy is easy to operate, and the whole family can use it anytime at any place without high technical threshold.



#### E.g. Basic Intervention: the weekly summary of diet

This strategy is useful to help child form conceptual schema from scattered knowledge, while presenting it on the KB wall makes the viewpoints meaningful, practical, which achieves combination of theory and practice perfectly. On the one hand, these valuable research findings won't be lost via putting on the KB wall, on the other hand information presented on the wall can be seen at any time, which makes it convenient for all family members to continuously construct and improve their viewpoints.



### Select-able Intervention:

#### E.g. invite the kid to participate in food preparation

Another application example is Select-able Intervention, which happened on January 6th, we invited the kid to make taro dumpling. We happily found the kid has built up his own knowledge of making taro dumpling and the ingredients of the taro dumpling through direct experience. Moreover, a lot of KB discourse was generated when the kid showed great interests and zeal for food in the process of food making.



**Accidental intervention:** Accidental Intervention usually consists of a range of parent-child KB discourse.  
E.g.

When the kid only had some chicken wings and soup for dinner on December 25<sup>th</sup>, I immediately said, 'You ate very little today, anything wrong?'

My kid said, 'I am full!'

I said, 'My honey, I wonder whether you have tried all three sorts of colored food today? You will be stronger and healthier by eating these nutritious food in three colors every day!'

After above conversation, my kid seemed to understand, so he picked up his chopsticks again, then he ate a mouthful of rice (yellow), a mouthful of vegetables (green) and an egg dumpling (red).

On December 31<sup>st</sup>, in the hotel, when I found my kid enjoyed his meal and ate breakfast fast, I immediately praised him and aroused him to analyze the nutrition of what he had had.

On January 1<sup>st</sup>, at home, after he ate a steamed bun, I started another conversation with the topic of 'what's in the vegetable steamed bun?'

These potential learning opportunities keenly captured in my family are well developed into Knowledge Building learning situations. Besides above examples, much more learning opportunities exist in our daily life, so if only you try, appropriate interventions would have effective effects on knowledge building.

### Strategy adjustment

It is important to point out that basic intervention and select-able intervention are not fixed throughout the project. When the situation is not consistent with the expectation or the original strategy is no longer suitable for the family members' improvement of the cognitive level, the intervention strategy may be added or adjusted on the basis of the original one, or even temporarily cancelled.

Example: the third week, although the kid had a basic understanding of balanced nutrition, he didn't make any changes in his dining behaviors. At this moment, the strategy of daily dietary nutrition analysis and evaluation form were added, but they were removed two weeks later. (strategy addition and removal)

Still in week 3, the kid lacked problem awareness and played an passive role in the process of knowledge exploration. I puzzled whether the knowledge in picture books is too difficult, whether I shall present picture books which share the same topic from different angles. (strategy adjustment)

In summary, the basic intervention is the core of this problem, while select-able intervention and accidental intervention play roles in strengthening and promoting. But the relationships among three types of interventions are not fixed. For some problems, the accidental interventions may be required only.

### Another example: the case of dining etiquette

The case of dining etiquettes is mostly of accidental interventions. The following discourse are randomly extracted several scenes of a day from my diary, all of which have been successfully discovered, captured and promptly intervened by family members to facilitate the improvement of kid's knowledge building.

E.g.

Time: Before dinner, on December 22<sup>st</sup>

Scene:

My kid looked at the 11 dining etiquettes with interest.

KB Discourse:

He said suddenly, 'we have to add a rule that we can't spill food on the beer!'

I said in support, 'OK' (Although it's not logical)

Time2: At dinner, on Dec. 22, 2018

Scene:

My kid is beating the bowl with his chopsticks.

KB Discourse:

His grandmother reminded, 'You can't knock the bowl with chopsticks, so very impolite!'

My kid put down his chopsticks and ran to the "Knowledge Building Wall", while he seeked the 11 dining etiquettes that we had written together for dinner. "

I asked, 'Is there one?'

He said, 'no!'

I said, 'Shall we add one,?'  
 My kid said, 'OK!'

Time3: After dinner, on Dec. 22, 2018

Scene:

My kid came up with a dining etiquette and said, 'Don't burp in front of people while eating!'

KB discourse:

He asked to write it himself, and I gave him the opportunity.

.....

In summary, when applying three types of interventions based on informal family setting, it is worth noting that these interventions strategies are flexible, freely-combined, easy for the whole family to carry out, also they are embedded perfectly in daily life. In other words, it is in the daily life itself that learning by doing has been achieved.

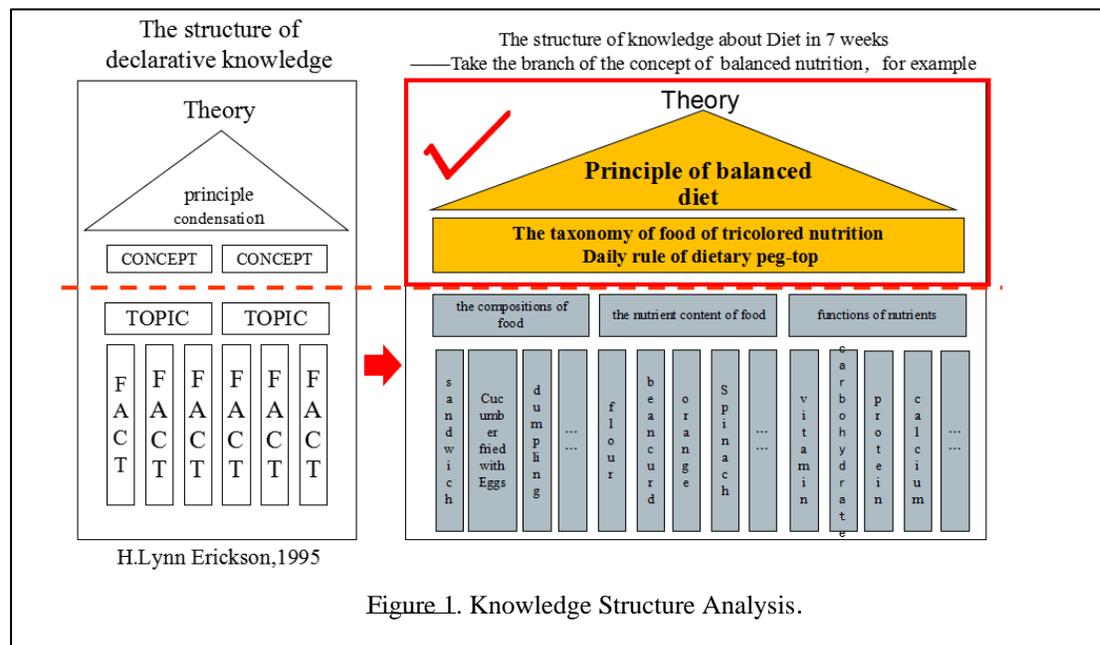
## Analysis & Results

After seven-week intervention and observation, the following conclusions, which are mainly from two aspects focusing on the assessment of the kid's cognitive and behavioral changes can be drawn from research.

### Cognitive Assessment

The kid's cognitive assessment: the knowledge structure chart (Lynn Erickson,1995) was used as an analysis tool to analyze the kid's food knowledge and its structures involved in the past 7 weeks.

Taking the concept of balanced nutrition as an example, during 7 weeks, a total of three major topics, under which a great deal of factual knowledge is included are involved in food materials, food ingredients and etc. It could be found that although the kid has already grasped the factual knowledge, he still needs more to go beyond newly-formed knowledge cognition, so we are supposed to guide the kid to develop conceptual understanding as well. Only if learning achieves the level of conceptual understanding, can transfer occurs and manages to support individual meaningful construction, arouse learning enthusiasm and motivations, so as to inspire us to make good use our brains better. (Lynn Erickson, 2018). The whole conceptual knowledge involved in 7 weeks mainly includes tricolor nutrition, dietary gyro rules, and principles of balanced nutrition etc.



In terms of cognitive assessment, some findings can be obtained from daily observation. However, they are too scattered and inconvenient, so I designed a performance task focusing on the creative levels to conceptual knowledge and invited the kid to complete individually. The kid was encouraged to design a breakfast and dinner recipe for himself and his grandfather respectively with the requirement of focusing on the balanced nutrition, also drawing is surely permitted. In the process of experiment, when the kid was found to come across difficulties, I appropriately tried simplifying the test by setting questions. Through the analysis of his answers and performance in the test, the kid's cognitive level in terms of conceptual knowledge and factual knowledge has been shown in the following table:

In addition, it can be determined that the kid has constructed cognitive system of the following procedural knowledge to some degree through the daily observation. Especially, I'd like to highlight his design of eating rules at home, which are full of creativity. He often creates a meal etiquette individually and asks me to present it on the Knowledge Building wall.

| category                   | knowledge                                       | memory | understand | apply | analysis | assess | create |
|----------------------------|---|--------|------------|-------|----------|--------|--------|
| A. factual knowledge       | The compositions of food                        | ■      |            |       |          |        |        |
|                            | Functions of nutrients                          | ■      |            |       |          |        |        |
|                            | The nutrient content of food                    | ■      |            |       |          |        |        |
| B. Conceptual Knowledge    | The taxonomy of food of tricolored nutrition    | ■      | ■          | ■     | ■        | ■      | ■      |
|                            | Daily rule of dietary peg-top                   | ■      | ■          | ■     | ■        | ■      | ■      |
|                            | Principle of balanced diet                      | ■      | ■          | ■     | ■        | ■      | ■      |
| C. procedural knowledge    | The procedure of making food                    | ■      | ■          | ■     | ■        | ■      | ■      |
|                            | Dining etiquette                                | ■      | ■          | ■     | ■        | ■      | ■      |
| D. metacognitive knowledge | Can look up information when I don't understand | ■      | ■          | ■     | ■        | ■      | ■      |
|                            | Critical thinking of authoritative sources      | ■      | ■          | ■     | ■        | ■      | ■      |

Figure2. The Kid's Cognitive Assessment

Therefore, the conclusion has been drawn that the design of knowledge building based on family setting can promote the kid's relevant knowledge of food. It was 7 weeks when he has not only successfully built factual knowledge, but also grasped conceptual and procedural knowledge, including constructing the concept of balanced nutrition and achieving the level of analysis, grasping the knowledge of dining rules at home and achieving the level of creativity. Additionally, some nascent meta-cognitive knowledge has occurred and formed.

### Behavior Assessment

In the aspect of behavior assessment, daily observation was mainly applied to examine the kid's performance related to balanced diet and the dining etiquette.

The left column is the kid's initial performance, and the right is the performance after 7-week experiment. According to the performance analysis, there is a significant improvement both of two behaviors.

Table 1: the kid's behavior Assessment

| behavior dimension | initial performance | performance after 7-week |
|--------------------|---------------------|--------------------------|
|                    |                     |                          |

|                  |   |  |
|------------------|---|--|
| balanced diet    | eat according to his mood; eat less                                 | <p>①He often reflect on his own initiative whether he has eaten all three colors food and what kind of food he lacked, and then takes the initiative to eat.</p> <p>②He often praised himself on his balanced eating behavior after the meal——“I’m balanced today.”</p> <p>③Basically, he eats different kinds of food. If he is picky about food, sometimes he will correct after being reminded, but sometimes he will still be capricious.</p> <p>④He seldom has leftovers.</p> |
| dining etiquette | running around at dinner; Knock the bowl with his chopsticks; ..... | <p>①Uncivilized dining behaviors sometimes still happen, but he can correct immediately after reminding.</p> <p>②If this uncivilized dining behavior is on the KB wall, he will take the initiative to look, if not, often will propose to add one more.</p> <p>③He often corrects others uncivilized dining behavior, for example: watch mobile phone when eating, do not wash one's hands before eating etc.</p>   |

### Discussions & Next Steps

In addition to the improvement of the cognition and performance, the boy's emotion, especially his learning ability relevant to literacy, self-consciousness, self-confidence, inquisitiveness, problem consciousness, reading interests has been improved significantly in the process of daily observation. For example, he often instructs his grandma to buy vegetables, observes nutrition table on the food packaging and sets some questions etc. The measurement scheme will be designed and evaluated in the later research.

Parent-child conversation, which is regarded as an important means of KB in family setting plays the role as a learning scaffold to some extent. How to explain? How to lead thinking? Have a continuous research on inductive strategies.

The model of Parent-child KB discourse for 3-year-old kid is mainly shared discourse. With the growth, can this model be guided to negotiated model, superior model or sublimation one? How to lead? It is worth continuously studying in family setting.

### References

- Bereiter, C., & Scardamalia, M. (2010). Can children really create knowledge? *Canadian Journal of Learning and Technology*, 36(1).
- Ding, Nuozhou, & Zhang, Min. (2016). From building the world view to boosting the economic development— On the history and the current situation of the Japanese ‘Shokuiku’. *Primary & Secondary Schooling Abroad*, 2016(6), 29-35.
- Erickson, H.L., & Lanning, L. A. (2018). *Transitioning to Concept-Based curriculum and instruction: How to bring content and process together*. Shanghai, China: East China Normal University Press.
- Li, Lite. (2006). Focus on food education which is the significant area of education. *BeiJing Observation*, 2006(5), 58-61.
- Zhang, Yibing. (2018). *Knowledge Building*. Nanjing, China: NanJing Normal University Press.